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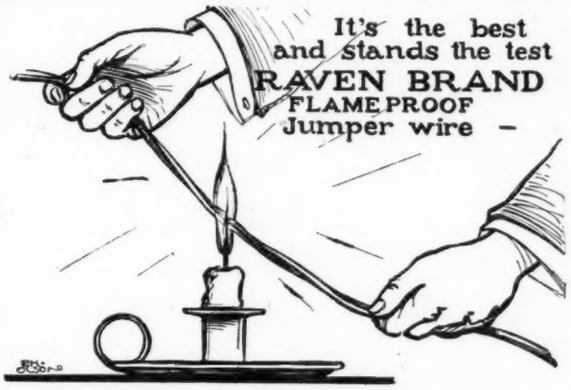

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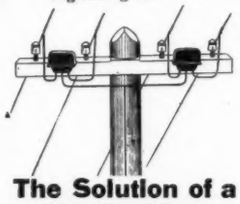

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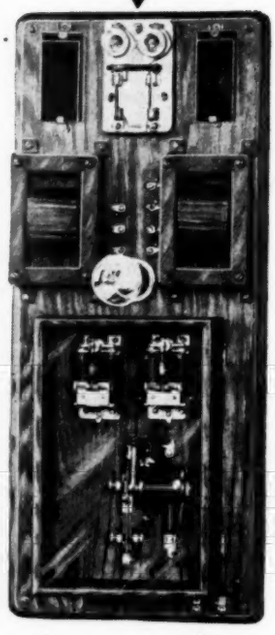

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Telephony.

THE AMERICAN TELEPHONE JOURNAL

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EDUCATION NEVER COMPLETED.

No man who is in mental health ever completes his education. His condition of bodily vigor has a decided effect upon it, but nothing short of a mental breakdown or death, puts an end to his acquirement of what we call an education.—George A. Hoadley.

The Mutual Interest of Public and Utility in Rates.

The question of rates is one in which telephone men are greatly interested, especially in those states where the public utilities commissions have jurisdiction over them. In fixing rates which will produce a definite return on the investment so that a specified dividend of 6 to 8 per cent. may be paid, the matter of management comes up. It is well known that, given exactly similar operating conditions, there may be and frequently is, a wide difference in results or profits shown by two companies.

One company may be progressive and possess an alive-to-every-opportunity spirit through which costs may be reduced considerably, and at the same time better service furnished. The other company may furnish an indifferent service with high costs which may be due to leaks in its methods of operating. There may be, in other words, a great difference in the plants, service and methods of management of the two companies. Yet when rates are fixed, the higher efficiency of management of the progressive company is not rewarded, for it is not permitted a higher profit or return. Its rates are lower, while the other company with a management incapable of producing as good results under similar conditions, is allowed to charge higher rates than are permitted the first company.

Restricting the earnings of efficiently managed public utilities and placing them on a par with companies not so well managed, make it essential that care be exercised not to carry the tendency to such an extent as to stifle initiative. To counteract the inclination of public officials to carry too far their zeal to prevent utilities from making excessive profits, what is known as the "London sliding scale system" has been evolved. The theory is that, if the company makes a decrease in its rates, its dividend rate may be increased. On the other hand, if the rates are raised, the dividend must be decreased.

This plan was adopted in Boston, Mass., some ten years ago in connection with the rate for gas. It was decided that a rate of 90 cents per thousand feet was a fair price for gas and that the gas company was entitled to a 7 per cent. profit. The sliding scale, which was applied, provided that an additional ½ per cent. dividend could be paid by the company whenever it decreased the price of gas five cents a thousand feet. But should the company raise its rate five cents per thousand feet of gas, it must pay stockholders ½ per cent. less in dividends.

Soon after this plan was put in operation, the company found it could sell gas at 80 cents per thousand feet and the stockholders received an 8 per cent. dividend. Thus under this arrangement the stockholders and the public both benefited by a decrease in the price of gas, while both would have been unfavorably affected by an increase.

This plan of making the interests of the public and those of the utility identical seems to be one answer to the contention relative to rewarding efficiency in management and encouraging initiative in their operation. While this seems to be a most rational theory of rate making, it is dependent, primarily, upon a unit charge, something which has not as yet been evolved in the telephone field. Rates for water, gas and electricity are all reduced to a unit basis of gallon, cubic foot and watt-hour.

In the larger cities of the country, there is a tendency towards the use of a "message" as a unit for telephone service. The closer analysis gradually being made of costs of telephone service, will eventually result in a unit of service being evolved and it will become a factor for consideration in telephone rate making. Whether or not the sliding scale system will come into use in fixing telephone rates will depend largely upon how the present method of adjusting rates at certain intervals, as is practiced in Chicago and New York, for instance, works out. Its introduction is too recent to judge results at present.

Factors Tending Towards "The Revival of Business"

One of a Monthly Series of Articles Written with a View of Helping Readers to Think, by Supplying Fundamental Information Rather Than Conclusions—Salient Features Bearing Directly Upon Economic Position of this Country—Future Curtailment of European Credit

By Frank M. Huston,

Financial Editor, Chicago Evening Post—Editor, Rand McNally Bankers' Monthly.

With prosperity in evidence in all directions and with a year behind us containing developments unprecedented in the history of the country, we are entering a period that promises a further broadening of the field of American endeavor. That our war business with Europe has stimulated a revival of general business activity, to an extent unbelievable a year ago, is obvious.

The year to come is likely to develop into a period of stabilizing this activity through an expansion of domestic business. Profits from the war business have been abnormal. This is evidenced by the fact that our volume of trade with foreign countries in the last year totals $5,355,580,000. Out of this we have created a credit balance of approximately $1,747,390,000. This affords us fortification in a financial way that necessarily must minimize the evil effects of the economic readjustment which the cessation of hostilities in Europe will bring.

What the effect of the war will have upon the far future of nations, is difficult to foresee. Suffice it, however, to say that there are unmistakable evidences that this country is no longer dependent upon the European war for its prosperity. The tremendous war orders, which have poured in upon us, stimulated but did not create the forces making for great activity here. The United States had been passing through a period of relatively lean years and a fat year was about due. Uncertainty following the outbreak of the war, caused hesitancy for a period which the influx of orders to fill the needs of Europe dispelled, until now many lines of trade and manufacture are running at full capacity.

It is well, therefore, to note the salient features bearing directly on the economic position of this country.

First, and foremost, the enormous increase in exports which, combined with slightly increased imports, brought us a total trade exceeding the largest previous year by 25 per cent., and yielding a credit balance two and a half times as great as any previous balance in our favor.

Second, increased banking facilities under the operation of the federal reserve system and, in consequence, of an inflow of $415,000,000 in gold, affording us a rapid increase in available credit.

Third, farm products exceeding $10,000,000,000 in value and stimulating a much needed diversification in crops in the South.

Fourth, recovery in railroad earnings stimulating the impaired credit of the railroads and restoring normal purchasing power to our transportation systems which are the chief customers of other industries.

Fifth, revival and growth of manufacturing under the stimulus, first, of war orders and of a greatly stimulated home demand, to an extent unprecedented, especially in the steel trade.

Sixth, the absorption by American investors of approximately $1,200,000,000 of our securities formerly held in Europe, without serious disturbance to our own credit situation.

Seventh, the development through the channels of trade and finance of an international, in lieu of a provincial position in the world's banking, and the reaching out for a more active participation in the world's trade.

Eighth, revival in American shipbuilding and the determination to develop a merchant marine in keeping with the country's resources and wide-spread increase in our foreign commerce.

While much has been said regarding the effect of a sudden determination of the European war upon the American business, none of these things, which have been outlined, will be lost to this country by the restoration of peace. Europe will need a large volume of our products for a time. That she will later on become a competitor in the scramble for our gold is also obvious, but this country will be able to protect our industries and our own markets through tariff regulation.

In our competition in foreign markets, such a handicap as may confront us through cheaper European labor, if such there be, will be offset to a considerable extent by our strong financial position, enabling us to lend unstintingly to those markets which offer great opportunities but which need the aid of foreign capital.

The time may come when the European credit situation will necessitate a curtailment in our extension of credit to the belligerent countries which are now our great customers. But that same curtailment of credit will limit those countries' ability to extend credit to the neutrals where we may find, through our greater freedom in trade and vastly increased financial resources, an opportunity for trade conquest, which may be stimulated through commercial alliance and reciprocal arrangement sufficiently to develop larger markets for our own goods and assure a ready exchange for the goods of others.

The possibilities and opportunities in South America, in China and in other parts of the world, have been made greater by the developments in our financial strength in the last year. Europe in the past has labored to its own great profit in these various countries but the curtailment of Europe's credit, through the effect of the war, leaves to this country a golden opportunity. This cannot help stimulating our own industries of every character, for the broader our markets, the stronger our financial and industrial position will be, and the more prosperous will be our industries of every kind, even to our local enterprises.

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Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25, 1915—Part III, Telephone Accounting and Auditing, by James H. Shoemaker, Completed January 15, 1916—Installments Now Being Presented Comprise Part IV, Telephone Finance, Written by J. C. Kelsey and S. R. Edwards

[EDITOR'S PREFACE: With this issue a new subject, "Telephone Finance," is taken up as part of "Fundamental Principles of the Telephone Business." In operation and installation work, telephone companies have standards of various kinds and these are quite well known. When the subject of financing is brought up, however, the companies have no standards which they apply.

It is in line with setting forth the principles of finance which are now generally recognized in the various industries, that this part of the reading course is written. Upon the financial makeup of the telephone company will depend its ability, or inability, to finance itself economically. Knowledge of definite principles and their application to the telephone companies are essential to all who are interested in an organization's management.

The topics to be considered in this part of "Fundamental Principles of the Telephone Business" include the corporate funds and their sources, bonds and their purposes, working capital, sources of funds for making improvements and extensions, earnings and their disposition, the work of the promoter, consolidations, reorganizations and other matters which have to be considered in the financial end of the business.

"Part IV, Telephone Finance" will be written by J. C. Kelsey and S. R. Edwards.]

CHAPTER I. The Funds of a Telephone Company.

1. *Standards in Finance as Well as in Other Activities.*—In school life, our studies follow what might be called an orthodox plan of presentation. Later, as one studies electrical, mechanical or civil engineering, or other professions, there follows a standard or orthodox plan of presentation. In other words, we all learn the same things in the same way. If we did not have a set of standards in everyday life, we would labor under great disadvantage.

The study of finance seems to follow an orthodox or standard way of presentation. Financial matters have a written interpretation just as much as law, medicine and engineering. There is just as much efficiency, proficiency, simplicity and science in the handling of finances as any other activity of life. In the financing of telephone companies will be found all of the various principles and methods utilized in financing other industries. There are now well defined principles in regard to financing which all well managed, successful organizations of the various industries follow.

To clearly understand all the principles applying to telephone finance, it is necessary to define and consider many financial terms before showing their application to telephone finance. In "Part II, The Corporate Telephone Organization" and "Part III, Telephone Accounting and Auditing," many of these terms have been discussed.

2. *Kinds of Capital.*—In order to operate any business, no matter what its organization may be, money is essential. This money is obtained in many ways, and is most easily secured through the corporate form of organization, as a corporation is able to dispose of an interest in its business to a great number of people scattered all over the country. That which is supplied by stockholders in return for shares of stock—that is, for the privilege of sharing in the profits of the organization—is termed "owned capital" while that obtained from banks, bonds and note sales, giving as security a claim on the assets of the company in case of failure to pay interest or principal according to agreement, or money withheld from creditors with which the corporation has done business, is called "borrowed capital."

3. *Examples of Owned Capital.*—There are numerous examples of telephone corporations which belong exclusively to the owned capital class. The Kellogg Switchboard & Supply Co. has but one class of stock—common stock—and has no debts of any character. The Union Telephone Co., of Owosso, Mich., managed by William J. Melchers, has over 10,000 telephones and $1,000,000 of owned capital—all common stock. It was once the pride of the Missouri & Kansas (Bell) Telephone Co. of Kansas City, Mo., that it was an "owned" capital company—it did not owe a dollar in the world.

4. *Borrowed Capital.*—The typical condition of our corporate existence is a problem of borrowing capital. It is the most natural condition of business life for active people to use the money of other people who prefer to be inactive and live on the income from their money principal.

A millionaire has been defined as a man who has succeeded in borrowing a million dollars. It goes far to explain why so many rich men are found to be practically poor when their estates are settled up. Edwin Hawley, a railroad king reputed to be worth $30,000,000, and who often borrowed $10,000,000 without security, was found to be worth less than $3,000,000. The late Norman Ream, once a Chicago man, a friend of Morgan's, a director of many enterprises and rated at $70,000,000, was found to be worth less than $3,000,000. The human proportion of owned to borrowed capital seems to be about one to ten.

When one goes into the money market to obtain money for the proper conduct of his business, he will find that there are six general sources of money, viz.: 1. The active interests of the company; 2. Profits of the business; 3. The company's creditors; 4. The banks; 5. The investing public; and 6. The speculative public.

5. *Funds from the Active Interests.*—The active interests of a company comprise the men who will be or who are most interested in the business; in other words, the men on the inside, who are fully informed as to the desirability of reaching out for more capital. Usually such men are ready to share in the expansion of the business, and buy the stock or loan the money without much persuasion, or at least without expensive effort.

It has now become general to invite employes to participate in the distribution of stock at a certain fair price. This plan brings the men under the wing of the company without the usual cost of advertising, payment of commissions or issuance of bonus stock.

6. *Profits of a Business as a Source of Funds.*—The second source of money supply may be from the profits of the business. Some private businesses are so profitable that they can pay a reasonable dividend and at the same time allow a certain amount of cash to go into the business, appearing later in the form of a stock dividend. Today, under commission control, no public utility corporation can depend upon profit for a very substantial source of extension money supply.

The early Bell companies under monopoly grew rapidly from the excess cash earned out of the business. The Kansas City rate case in 1903 showed that the Missouri & Kansas (Bell) Telephone Co. had $1,000,000 worth of property, while not more than $50,500 cash from external sources was ever visible.

7. *Many Independent Companies Turned Earnings Back Into Plant Extensions.*—Many Independent telephone companies have financed themselves by passing all dividends and devoting the money to extensions. It is one way of getting 100 cents for every dollar put into the plant. The Keystone Telephone Co., of Philadelphia, until recently, has used its earnings for extensions instead of dividends, simply because the bond market was very poor.

The management could have sold the bonds at 92½ but preferred to do without dividends in preference to paying such a high price for money. Some day when the bond markets are favorable, the bonds will be sold and the stockholders will be recouped in cash. Such financing is above criticism from everyone except the stockholder or the owner of the owned capital. He, alone, is the judge of the propriety of this source of corporate funds.

8. *Funds from Trade Creditors.*—Obtaining capital from trade creditors is a popular method of procedure, especially where manufacturers have no alliances or agreements and the pursuit of business is keen. The Independent telephone field has taken full advantage of this source of corporate funds as can be attested by Roebling, Stromberg-Carlson, Kellogg, Automatic, Garford and other manufacturing companies. No other line of industry has given so much aid to its customers.

Suppose a switchboard, telephones, cable and supplies cost $10,000, for instance. If the telephone company could not get credit from the supplier, it would have to go elsewhere for that much cash. If the dealer is willing, or can be forced to give long time terms, then the company has the use of the creditor's $10,000. It is no uncommon thing for our Independent telephone manufacturers to carry one company for $50,000—for a long time too.

A manufacturer or dealer is placed somewhat like a bank for he must either have the money or be a great borrower himself. He cannot give long terms on payment except at a great risk to his own existence. His ordinary sales are billed 2 per cent. for cash in 10 days or 30 days, net, while switchboards of large size are supposed to be paid for in nine months. A $10,000-switchboard is expected to be paid for as follows: $2,500 cash on delivery of sections, $2,500 in three months, $2,500 in six months and $2,500 in nine months thereafter.

This is supposed to be the limit to which the operating telephone company can rely on the trade creditors as a source of corporate funds. In practice, how does it work out? It usually run 27 months or more. It works as follows, and there is plenty of proof that it does:

9. *How the Trade Creditor Supplies Corporate Funds.*—When the three months' account falls due, the company pays $1,250 and puts up a hard-luck story asking that a $1,250-note be made out to fall due in 12 months. When the six months' note comes due, the customer sends $1,250 and asks for a new note of $1,250 due in 15 months. When the nine months' note falls due, the customer pays $1,250 and a new note is made out which is due 18 months from date of delivery.

When the 12 months' note for $1,250 is due, a check for $625 is sent and a new note given for $625 falling due in 21 months. When the 15 months' note for $1,250 matures, a check for $625 is sent and a new note for $625 comes into existence, maturing in 24 months. When the 18 months' note for $1,250 falls due, a check for $625 is sent and a new note for $625 completes the cycle of credit extension to 27 months.

Thus a $10,000 debt, instead of being extinguished in nine months is paid as follows:

$2,500 cash upon delivery; $1,250 in three months thereafter; $1,250 in six months thereafter; $1,250 in nine months thereafter; $625 in 12 months thereafter; $625 in 15 months thereafter; $625 in 18 months thereafter; $625 in 21 months thereafter; $625 in 24 months thereafter, and $625 in 27 months thereafter. The telephone company thus forces the creditor to act as a source of a $10,000 fund for 27 months.

This method is a most human one. The doctor, dentist, grocer, butcher, and those in every walk of life, readily realize that the trade creditor is the most convenient source of funds known to the human race.

What man will go to a bank to borrow money to pay the doctor, the tradesman and the deserving supplier of his needs? He will let them wait and if they become persistent, will jolly them along until ready to pay.

10. *Banks Supply Credit.*—Banks are dealers in credit. It is their primary object in life to furnish money for commercial enterprises. They buy the credit of a corporation and sell their own credit in the form of deposits. A bank necessarily must meet every check drawn upon it. This accounts for the accusation that banks encourage speculation in listed stocks in preference to less liquid business loans. No bank can handle anything but demand paper or short-time paper such as that of 60 or 90 days' duration.

11. *The Investing Public and Corporate Funds.*—The salaried man, professional man, widow and heirs, estates, savings banks, and insurance companies comprise the fifth source of corporate income. It is this class that buys the bonds, preferred stocks, notes and such evidences of indebtedness. Business men are not in this class at all. They are always in need of funds and cannot draw money for external investment. They properly come under the first class of active interests.

Many telephone men have come to Chicago in search of borrowed money but met no success. The reason is plain—Chicago men are only borrowers. Philadelphia and some Eastern communities have money to loan but only a few Western or Middle Western communities have a dollar to loan beyond a few months. Not long ago, a New York man tried to interest the International Harvester people in a gigantic farming plan, something which might benefit them directly, but he learned that they wanted to borrow $15,000,000 and did not have a dollar to loan.

Generally speaking, business institutions have a motto,—"Millions for borrowing, but not one cent for a loan."

12. *Funds from the Speculative Public.*—In this speculative public class as a source of funds, are three sharply defined groups:

First, the class which buys wild-cat stocks, the variety advertised on full pages of daily newspapers that always advance in price at midnight. It is the class which buys peach orchards in Arkansas, apple orchards in the West, pecan groves in the South, or some article of industry which will bring great (?) returns.

Second, the class of people who buy securities and hold them for a rise because they are satisfied with the possibilities.

Third, the purely speculative class which buys and sells from day to day.

The third class is reached only by the stock market reports, while the first class is caught by lured advertisements and exaggerating circular letters. The second, or average class, is well listed by the various bond houses with whom the average corporation deals. *(To be Continued)*

Texas Independents to Hold Convention in March.

The annual convention of the Texas Independent Telephone Association will be held in Fort Worth, Texas, on Thursday, Friday and Saturday, March 16, 17 and 18. These dates and the place were decided upon, and other preliminary arrangements made, by the executive committee in a meeting at Dallas on January 27.

With the co-operation of the Chamber of Commerce of Fort Worth, which organization has offered to take an active part in the arrangements for the convention, the committees in charge expect to make the coming meeting the largest the association has yet held. Special effort is being made to offer an extraordinarily interesting program. Arrangements will be made, if possible, for several prominent telephone men from other states to address the Texas telephone people on topics of importance. There will be a banquet on the second day of the convention, and special entertainment for the visitors each day.

Chairmen of the committees appointed by the executive board are: W. K. McQuown, Sherman, finance; J. A. Smith, Fort Worth, banquet and hotel arrangements; C. A. Shock, Sherman, exhibits; E. C. Blomeyer, Waco, program. Publicity will also be handled by E. C. Blomeyer, who is secretary of the association. The executive committee of the association is composed of J. C. Casler, Dallas; J. B. Earle, Waco; C. A. Shock, Sherman; T. H. Hughes, Palestine; W. K. McQuown, Sherman, and E. C. Blomeyer, Waco.

Arangements have been made for reduced rates on all railroads from Texas points for the convention. Invitations are being sent to all state association officials. Arrangements have been made for ample space for exhibitors at the convention hall. The complete program will be announced later.

Program for Wisconsin Convention.

The program for the seventh annual convention of the Wisconsin Telephone Association has now been arranged. The convention will be held at the Park Hotel, Madison, beginning February 9 and concluding February 11.

The directors of the association and the committee having charge of the program have tried to leave ample time for informal discussions, using the papers and addresses more in the form of a background from which individual ideas and practical applications may spring forth. The manufacturers will occupy the entire second floor of the hotel with their exhibits and buyers will have an excellent opportunity to make direct comparisons.

The program is as follows:

WEDNESDAY MORNING, FEBRUARY 9.

Meeting of board of directors.

Meeting of permanent and special committees.

AFTERNOON.

Address of welcome, Mayor A. H. Kayser.

Response, J. C. Crowley, of Superior.

Address, President W. L. Smith, of Neillsville.

"Methods Employed in the Valuation of Physicial Properties," C. M. Larson, of Madison, railroad and utilities engineer.

EVENING.

Theater party at Orpheum Theater.

THURSDAY MORNING, FEBRUARY 10.

Reports of officers and committees.

"Service," W. S. Vivian, of Chicago, secretary-treasurer, United States Independent Telephone Association.

Subject for discussion:

"Organization in the Telephone Business."

AFTERNOON.

"Placing the Telephone Business before the Public," F. H. Runkel, of Portage.

"The Help Question," Walter J. Gallon, of Sheboygan.

Subjects for discussion:

"Uniform Methods of Collection."

"Excess Radius Rates for Private or Limited Rural Lines."

"The Joint User, or, Three Families to One Telephone."

"The A B C of Telephone Accounting," J. M. Storkerson, of La Crosse.

6:00 P. M., DINNER.

President Charles R. Van Hise, of the University of Wisconsin, will be the speaker.

FRIDAY MORNING, FEBRUARY 11.

Association business.

"Cost of Service as a Basis for Rate Making," Halford Erickson, chairman, Railroad Commission of Wisconsin.

Subject for discussion:

"What the Net Rate of Interest Should Be," E. J. Kneen, of Bangor.

"Keeping Step with the Times," H. N. Tolles, of Chicago, vice-president, The Sheldon School.

AFTERNOON.

"The Electric Wave and Its Propagation" (Illustrated), Prof. Earl M. Terry, Physics Department, University of Wisconsin.

EVENING.

Transmission demonstration of transcontinental line, Madison to San Francisco.

Notes on Heat Coil Protectors in Telephone Exchanges

Purpose of Protection—Operating and Other Characteristics of Heat Coils as Shown in Results of Tests—Resistance and Current Rating—Temperature Effects—Factors Affecting Reliability—Age as Affecting Coils—Heat Coils and Transmission

By R. V. Achatz

Quite recently the writer was in attendance at a meeting of operating men when the question of protection was brought up. The discussion brought out the fact that there is a considerable amount of misconception as to the exact nature of the protection that the heat coil affords. Many of the men at this meeting were from small exchanges in districts where there are no transmission lines or electric railways. These men, whose experience had been principally with lightning, were of the opinion that the heat coil is of little or no value as a protective means.

The use and purpose of heat coil protectors has been explained very well in TELEPHONY'S Home Study Course and little can be added to this excellent treatment. However, there are certain characteristics in the operation of heat coils that have not been treated in detail and, in the belief that there may be some interest in the results of certain tests that have been made, the writer is constrained to set down the notes. No attempt has been made to make the treatment of the various characteristics complete. Only a few of the more important points have been covered.

PURPOSE OF PROTECTION.

To touch upon the matter briefly, there are two classes of external disturbances from which telephone circuits and apparatus must be protected. In the first class are excessive potentials like lightning and high voltage lines. The second class includes excessive currents which may enter the circuits as in case of crosses with low voltage lines.

High potentials will usually produce an arc from some portion of the apparatus to ground. A familiar example is the burning out of local battery switchboard drop coils, due to an arc from the winding to the core. Protection from this type of disturbance is secured by the use of some kind of an open space by-path which will offer a lower impedance to the disturbance than the path through the apparatus. The ordinary carbon protector and the vacuum type arrester are commonly used.

An excessive current has a somewhat different effect. A current flowing through a resistance will generate heat in proportion to the square of the current value. Telephone windings will carry from .2 to .5 of an ampere continuously without excessive heating. Larger current values than this, if continued for any length of time, will char insulation or even sometimes start fire. Fuses and heat coils are the protection used against such current.

Fuses are satisfactory for large currents but for protection against currents of the magnitude mentioned above they are not reliable. The fuse wire is so small that it is fragile. The current on which the fuse will operate varies with the temperature, age and other conditions. Furthermore, the fuse as ordinarily used, performs only one function, namely, the opening of the circuit. Heat coils are used to overcome these objections to the fuse for protection against small current values.

WHERE HEAT COILS ARE NECESSARY.

Heat coil protection is necessary only where circuits are exposed. The ordinary definition of an exposed circuit is a circuit, any part of which is aerial, where there is some source of foreign power in the vicinity. A strict interpretation of this would leave, in the unexposed class, only such circuits as are entirely underground and where no portion of the underground cable contains circuits which are exposed and cases of aerial lines in small communities where there are no electric light or trolley lines.

It is customary to use heat coil protectors in most common battery and many local battery exchanges. They are also used to some extent at local battery subscribers' stations. They are not considered necessary at common battery subscribers' stations as the condenser in the bell circuit will prevent the flow of direct current through the ringer and the impedance is sufficiently high to prevent an excessive alternating current flow.

Heat coils are more necessary as a protection against direct than against alternating current as the impedance of most telephone windings will keep the value of alternating current below a value which will cause damage.

OPERATING CHARACTERISTICS OF HEAT COILS.

As is well known, the operation of the heat coil depends upon the generation of heat due to the flow of current through a resistance medium and the application of this heat to a junction soldered with a metal having a low fusing point. By proper combination of the metals, lead, tin, bismuth and cadmium, an alloy can be secured which will melt at a comparatively low temperature. The composition of the alloy used by different manufacturers varies but the most commonly used solder will fuse at a temperature of about 160 degs. Fahr.

The heat generated by the flow of current through a resistance is given by the formula:

$$H = I^2Rt$$

where H = the heat, I = current, R = the resistance and t = time.

By transforming the equation to the form: $t = \frac{H}{I^2R}$

it can be seen that the time required to operate the coil would decrease very rapidly as I is increased. The time will not decrease strictly in proportion to the square of the current, however, as a portion of the heat is radiated from the surface of the coil and so is not applied to heating the junction.

The writer has conducted a series of tests to determine the characteristics of various types of coils. The first tests were made to find the relation between the current through the coil and the time in which it would operate. The method employed was to supply current to the coil from a few cells of storage battery using a rheostat to adjust the current to the desired value. The current value was read on a milliammeter in the circuit and the voltage at the terminals of the coil was read on a low-reading voltmeter. A stop watch was started when the circuit was closed and stopped when the coil operated.

Readings of voltage and current were taken at short intervals during the test. A suitable correction was applied to the instrument readings to correct for the current through the voltmeter and the resistance of the coil at the beginning and end of each test was calculated. In most cases a group of five coils of a given type were tested and the curve for each coil plotted separately. Data was then taken from the individual curves and the average curve plotted.

Fig. 1 shows the time-current characteristics of three types

of coils in common use. These curves are typical of the results found in the tests of all types of coils that were made. Curve No. 3 (the numbering of the coils is the same as in Fig. 2) is the characteristic of a wire-wound coil having a resistance of approximately four ohms. This type of coil will

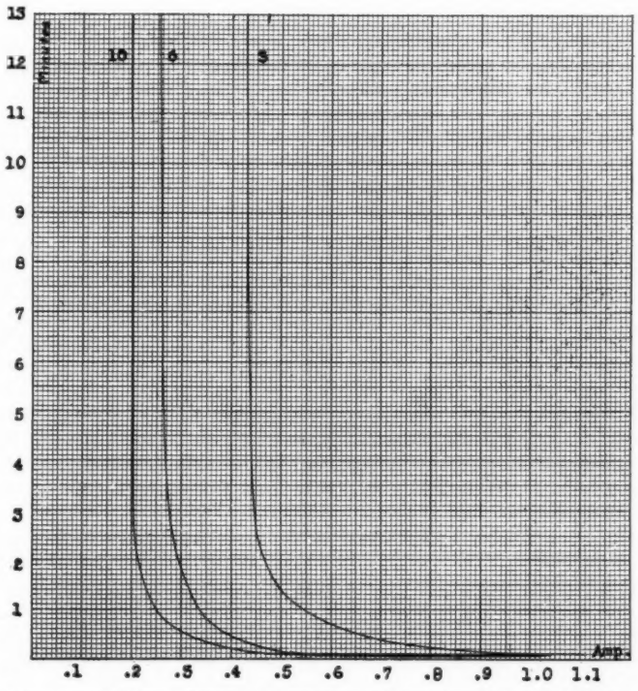

Fig. 1. Relation Between Current and Time Required to Operate.

carry .405 of an ampere continuously, will carry .54 of an ampere for one minute and will operate in about five seconds on a current of 1.1 amperes. Curve No. 6 is that of a different type of wire-wound coil having a resistance of approximately 8.5 ohms. This coil will carry .24 of an ampere continuously, will carry .335 of an ampere for one minute and will operate in five seconds on a current of about .65 of an ampere for 1 minute and will operate on .55 of an ampere in five seconds.

Abbott in his work on Telephony (Vol. V, page 371) suggests three methods of rating heat coils: First, a rating based upon permanent carrying capacity; second, a rating on current value that will cause the coil to operate in one second; and third, a rating in ampere-seconds. This last rating is secured by taking the portion of the curve where the curvature is greatest and finding the value of the current in amperes and the time in seconds. The product of these two values is the ampere-second rating.

The rating of the coils whose characteristics are given in Fig. 1 as shown by these three methods are as follows:

Coil.	Continuous.	Five Seconds.	Ampere-Second.
No. 3.....	.405 amp.	1.1 amps.	42
No. 6.....	.240 amp.	.65 amp.	20
No. 10.....	.190 amp.	.55 amp.	15

The rating on a one-second basis is impracticable as the current required to operate in this short time is very large and, in the case of the wire wound coils of some types, the insulation was burned and the coil became short circuited before it operated. In other cases the coil went open and did not operate. In consequence, the five-second rating is the shortest time that could be considered.

It would appear that the continuous current rating is the only one of much practical importance. The five-second rating is between 2½ and 3 times the continuous rating. The ampere-second rating is inexact as the value differs for every point on the curve. It is possible to derive an empirical formula that will give the time in which the coil will operate for any value of current. The constants, however, will be different for each type of coil and the usefulness of such a formula does not warrant the work required to determine the constants.

Effect of Resistance Upon Current Rating.

As would be expected, the coil in Fig. 1 which has the highest resistance, has the smallest continuous carrying capacity while the coil having the lowest resistance, has the largest capacity. The curve in Fig. 2 is plotted to show the effect of the resistance upon the effect of the design of the coil upon the continuous current rating. The ordinates of this curve show the average continuous current rating for each group of coils tested and the abscissæ represent the average resistance of the coils of the group at the time of closing the circuit for the test.

The small circles represent the results of the test of each type of coil. No. 1 is a very low resistance coil having a copper winding wound specially to obtain the characteristic of an extremely low resistance coil. Coil No. 5 is of the stick graphite type. Coils Nos. 9 and 10 are two groups of the same type of graphite resistance material coils obtained from two lots made several years apart. The other points are various types of wire wound coils. The curve is drawn as an average of the points.

From the curve in Fig. 2 a coil having a resistance of 30 ohms would be expected to carry, on an average, .15 of an ampere continuously. Coils having resistances of 14, 7 and 4 ohms will have continuous ratings of .2, .3 and .4 of an ampere, respectively.

The effect of the design of the coil upon the rating is shown by the position of the points representing the tests of the in-

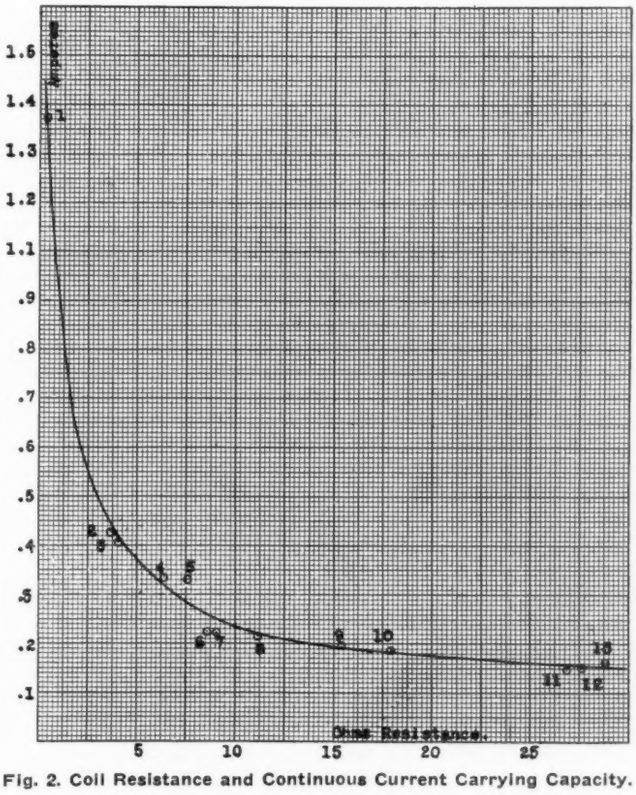

Fig. 2. Coil Resistance and Continuous Current Carrying Capacity.

dividual types of coils with respect to the curve. The two principal factors that will influence the rating, the resistances being equal, will be the ability of the coils to retain the heat generated and the temperature co-efficient of the resistance material. Obviously, a coil having a large radiating surface

will carry a larger current without operating than one having a smaller radiation.

For most types of coils, the curve shows little effect due to difference in radiating surface. The extreme cases are in coil No. 5 on one hand and coils Nos. 6 and 7 on the other. Coil No. 5 is a stick graphite coil having a large portion of the surface of the heating element exposed to air. The effect of this is shown by the fact that the coil has a capacity of about 10 per cent. more than the average coil of equal resistance as shown by the curve. Coils Nos. 6 and 7 are enclosed coils and, consequently have small radiating capacity and so fall below the curve. The variation in design of the other types of coil seems to show little effect of difference in radiation.

The other effect mentioned, that of temperature co-efficient of the resistance material, refers to the property of conductors that causes change of resistance with a change of temperature of the conductor. Carbon in any of its forms decreases in resistance as the temperature increases, while copper and most metals increase in resistance with increase in temperature.

Theoretically, the resistance material for heat coils should have a high positive temperature co-efficient so that the heat coil could have a low resistance when cold and increase rapidly in resistance when it heats up, thus increasing the sensitiveness of the coil. However, the temperature co-efficient seems to have little effect upon the characteristics of the coil as is shown by the similarity of the characteristic of the graphite resistance coil (Fig. 1) to the characteristics of the wire wound coils (Nos. 3 and 6 in Fig. 1).

The relation between the resistance and continuous current capacity, likewise, shows little if any effect due to difference in temperature co-efficient. The points for graphite coils (Nos. 9 and 10 in Fig. 2) having a negative co-efficient, wire-

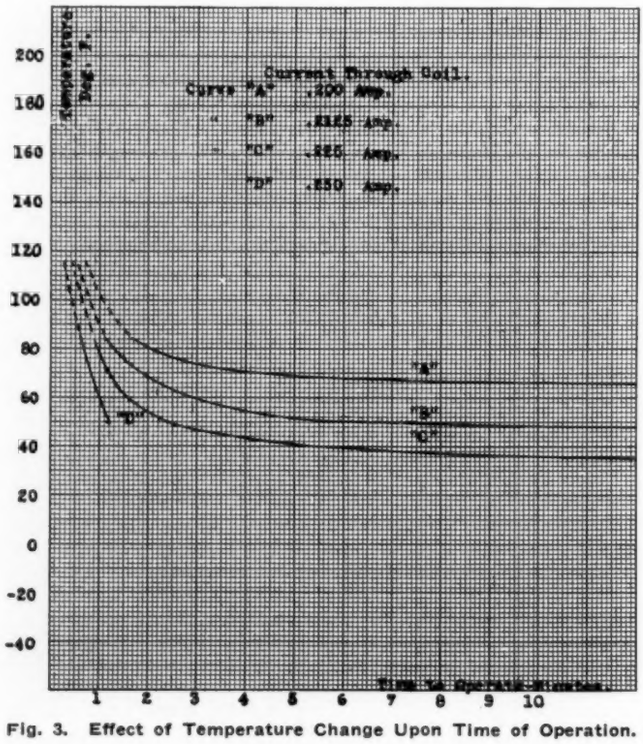

Fig. 3. Effect of Temperature Change Upon Time of Operation.

wound coils having a negligible co-efficient (No. 8) and coils having positive co-efficients (Nos. 2, 3, 11 and 12) all fall upon or very nearly upon the curve.

Since the heat coil depends for its action upon a thermal effect, the temperature of the surrounding air will have some effect upon its operating characteristic. The data for the curves in Fig. 1 and 2 were taken under approximately uniform conditions in a room kept at a temperature of 70 degs. Fahr. To obtain an idea of the effect of temperature upon the coils, tests were made of two types of coils at varying room temperatures. As the protectors were mounted upon a

Designation of Coil	Resistance at Start of Test High	Low	Av.	Resistance at End of Test High	Low	Av.	Change in Resistance High	Low	Av.
2	4.90	3.30	3.74	5.04	3.32	3.76	.16	-.42*	.02
3	4.18	3.64	3.83	4.07	3.63	3.85	.08	-.24*	.02
6	10.20	7.60	8.55	9.48	7.75	8.52	.65	-1.47*	-.03
7	10.12	7.87	9.00	10.02	7.89	9.07	.53	-.44*	.07
9	17.61	13.90	15.54	15.45	12.14	13.92	-.75	-2.22	-1.62
10	19.62	16.30	17.91	19.37	15.81	17.24	-.08	-1.20	-.67
11	28.05	26.10	26.88	28.70	26.30	27.41	1.60	-.05*	.53
12	32.50	28.00	28.88	33.00	28.60	29.60	2.00	-.10*	.72

The negative sign indicates decrease in resistance.
*Greatest decrease.

Variation in Resistance Between Coils of Same Type.

standard main distributing frame, it was impossible to control the temperature beyond the limits of the room temperature which ranged from freezing to about 85 degs. Fahr.

The tests were made by taking the time required to operate for a given current value at several temperatures. Four different current values were used. The coils tested were those designated as Nos. 6 and 10 in Fig. 2.

Fig. 3 shows the results of the test of coil No. 10, the results of the test on the other type of coil being very similar. The full lines show the portion of the curves actually obtained in the test and the dotted portions, the approximate location of the curves beyond the temperature range obtained. That there is a marked change in the continuous carrying capacity with a change in room temperature is shown by the curves. This coil, which will have a capacity of about .190 of an ampere at 70 degs. Fahr. (Fig. 1), will carry about .225 of an ampere at 32 degs. Fahr. and probably will carry only about .175 of an ampere continuously at 85 degs. Fahr.

The data is not sufficiently complete to draw conclusions that are exact, but we may expect the current capacity will change about 5 per cent. for every 15 degs. Fahr. change in the temperature of the room in which the protector is located.

Reliability of Heat Coils.

The reliability of any particular type of heat coil depends upon several factors, among them design, care in manufacture, variation in resistance between individual coils and, if repairable, upon the care with which repairs are made. It is difficult to determine the effect of each factor upon the general reliability of the type. An idea of the variation in resistance to be expected between coils of the same type may be obtained from the accompanying table.

The first three columns give the variation of the cold resistance between individual coils of various types.

Column 1 gives the highest resistance observed of any individual coil of the particular group under test. Column 2 gives the lowest resistance of any individual coil and column 3, the average resistance of all the coils of the group for all of the tests made. The second three columns give the resistance at the time of operation or the hot resistance of the coils. Column 4 is similar to column 1, column 5 to column 2 and column 6 to column 3.

The last three columns give the change in resistance during the test. Column 7 shows the greatest resistance change of any coil in the group, the negative sign indicating decrease in resistance. Column 8 shows the least change in resistance or in some cases where the resistance of the coil decreased, the greatest amount of decrease. Column 9 shows the average change in resistance for all of the coils and all tests of the coils of a particular type. It will be noted that most of the coils are subject to a considerable variation of resistance.

The exact cause of this variation is not determined but is probably, in some measure, due to change in contact resistance.

The variation of the individual tests from the average time-current characteristic, is shown for one type of coil in Fig. 4. All points taken in the test of the coils of this group are plotted and the average curve for the type is drawn through them. This curve is the same as No. 10 of Fig. 1.

Several types of the coils tested were repairable. These coils were repaired in the regular way after each operation and a record was kept of the failure of the repaired coils to operate in the expected time for the current flowing. The greatest number of such failures were found in two types of coils now no longer made. The number of failures was six and four out of 66 and 50 tests respectively. Two other types of comparatively recent design showed one failure each out of 61 and 44 tests. One type, a self-soldering coil, showed no failures to operate in the normal time.

Effect of Age.

It is a well known fact that the age of a small fuse has some effect upon its capacity. Sufficient data was available to draw some conclusions regarding the effect upon heat coils. The results of another investigation made about nine years ago on two of the types of coils studied were available. Coils of the two types which were made about the time of the previous tests were available and also new coils of one of the types. The design of the second type has been modified somewhat so that a comparison of new coils would be of no value.

The time-current characteristics of the two groups of old coils in the present series of tests varied less than 2½ per cent. from the curves obtained on the earlier test. The resistance of the group of new coils was about two ohms less than that of the earlier group (15.51 ohms for the new coils,

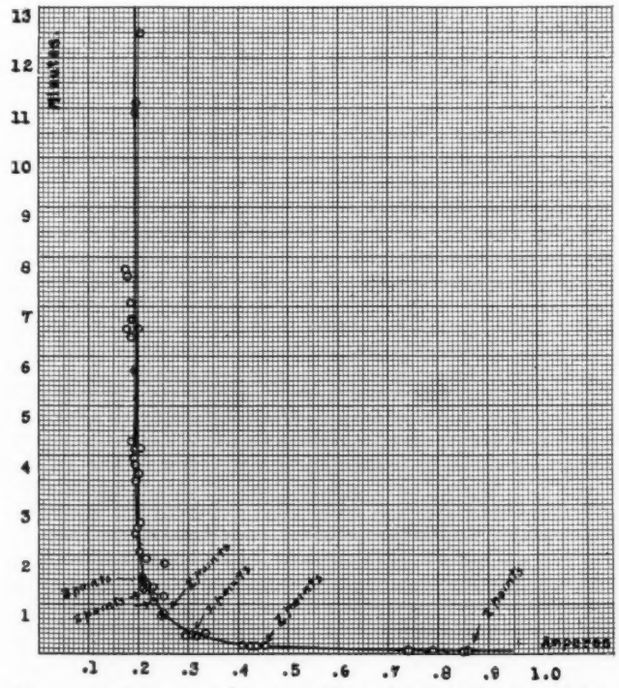

Fig. 4. Variation from Average Time-Current Characteristics.

17.91 ohms for the older coils). The characteristic differed by an amount that would be expected from the difference in resistance. It is not possible to give the reason for the difference in resistance, but it is likely due to some change in the method of manufacture. As far as the present tests and information go, the characteristic of any type of heat coil is affected very little, if any, by age.

Effect Upon Transmission.

If the heat coil protector is included in the circuit over which voice currents must travel, a certain loss in transmission will occur. This loss is usually included in the central office loss and is not given separately. The writer has made no tests as to the amount of this loss, but with some of the older, high resistance types which are not wound non-inductively, it must certainly be an appreciable amount. C. J. Larsen* gives the loss of an average wire-wound, heat coil as .5 of a mile of standard cable and Arthur Bessey Smith† has given the loss in a 15-ohm coil as .5 of a mile and in a 7-ohm coil as .12 of a mile of standard cable.

In any event, the certainty that a loss in transmission will result, makes it desirable that the resistance be kept as low as possible and, if wire-wound, that the coil be wound non-inductively. In circuits where the transmission efficiency must be kept at the highest possible point, as in toll lines, the arrangement of the apparatus should be such that the heat coil is placed in the signaling circuit but does not form part of the talking circuit.

Conclusion.

As a conclusion from the results of this series of tests it would appear that the resistance is the most important electrical feature of the heat coil since the continuous current carrying capacity depends almost entirely upon the resistance. The resistance should be low enough to give a capacity of from one and one-half times to twice the amount of current required in the circuit for which it is used as a protection, to provide a margin for variation between individual coils and also the effect of change of temperature upon the capacity. If the coil is to be included in the talking circuit, it should introduce as small a resistance as possible without sacrificing its effectiveness as a protection.

Beyond the choosing of a coil having the proper resistance, the selection of a type of heat coil protector may be based upon mechanical features, convenience, arrangement, space, indestructibility of coils and similar features.

*Telephony, Vol. 69, No. 19, page 30.

†Paper on transmission, read before a meeting of the Ohio Automatic Telephone Association, February 5, 1915.

American Association of Engineers Issues Journal.

At a recent meeting of the directors of the American Association of Engineers, held in Chicago, it was decided to publish an official journal for the advancement of technical engineering professions. The journal is to be issued monthly under the title of "The Monad," the emblem of the association. Each local chapter of the association will thus be enabled to give voice through this medium concerning local and national affairs of interest to their and all members.

The first issue of "The Monad," that for February, appeared this week. It contains a report of the convention held in Chicago in December and several of the addresses which were made. The constitution of the association as it has been amended is published in full. A number of news notes relative to the activities of the organization indicate the progress which it is making. A number of large Chicago concerns, including the Commonwealth Edison Co., Western Electric Co., Sargent & Lundy, Illinois Steel Co., and Fairbanks-Morse Co., have secured technical help through the association.

Improvements to Columbus, Miss., Plant.

Improvements entailing an expenditure of about $18,000 will be made to the Columbus, Miss., plant of the Cumberland Telephone & Telegraph Co. The entire building, in which the offices and exchange of the company, are housed, will be overhauled and extensive improvements made.

Massachusetts Investigation of Extension Sets Continued

Bell Officials Present Engineering Testimony in Support of Costs Filed at Previous Hearing—Independent Manufacturers Submit Cost Data Based on Factory Production and Discuss Effect of Lockout Policy on Equipment Sales

One of the most interesting hearings ever held by the Massachusetts Public Service Commission upon telephone matters took place on January 14 at Boston, when the board continued its investigation of extension telephones as required by chapter 42, acts of 1915, pursuant to reporting to the present general court whether legislation is needed relative to this equipment and the rates applying to it.

The first hearing upon the resolve was held on December 30, 1915, and was reported at length in TELEPHONY of January 8, 1916. At the second hearing the entire day was devoted to the presentation of expert evidence by the New England Telephone & Telegraph Co. in support of its contention that the yearly cost of service per extension set, based on a study of 600 work papers, is $6.89, testimony also being given by manufacturers of Independent equipment as to their production costs and as to the effect of the Bell policy of refusing connections upon apparatus sales.

CHIEF ENGINEER MANSON TESTIFIES REGARDING COST STUDY.

George K. Manson, chief engineer of the New England company, Boston, stated that the 600 work papers upon which the extension set first cost of $7.92 and the yearly cost of $6.89 were based are reports contained on the company's "Form 237," which is made out daily by the workman to show the number of hours of labor expended on each kind of work, with all miscellaneous expenses, material, carfares, etc. The papers were selected from representative offices in the state through a wide range, including magneto and common battery equipment.

In explanation of the items summarized on page 21, TELEPHONY of January 8, Mr. Manson said that the type of extension equipment varies considerably according to local requirements, the figures given representing the average of all the work papers studied. The supply charge of 36 cents per set (first cost data) includes teaming from the Western Electric warehouse in South Boston, freight or express to destination, cartage, wages of stock keepers, loss or breakage until installed. Small material is handled from South Boston in this way, throughout Massachusetts. The above cost was based on the percentage which the supply charges above listed bear to the total supplies distributed; i. e., for every dollar's worth of supplies there were 8.6 cents used in disbursing it in connection with these shipment and storehouse expenses.

Field labor installing includes $1.09 in installers' wages, 35 cents for foremen, inspectors, wire chiefs, dead time, etc., and 21 cents for superintendence. Superintendence represents 14.86 per cent. of field labor. The general investment in supplies chargeable to the extension set was obtained by apportioning to the extension set in the proportion of the latter's investment to the total plant investment per station. All classes of supplies were thus included. General equipment investment was apportioned in the same way. Working capital was apportioned to the extension set on the ratio of the extension set expense to the total expenses of the company. The total working capital of the company is about $2,000,000, including cash on hand, bills receivable, deductions for bills payable, prepaid accounts, etc.

Mr. Manson then explained the compilation of the annual cost data. Repairs include supervision and superintendence. Station removals are based on the withdrawal of 52,178 stations in the state in ten months, of which 20,947 were re-used. The latter is handled as a current operating expense instead of by depreciation reserve. If the apparatus is sent to a repair room where it has to be repaired and dismantled, that is charged to depreciation reserve. The loss represented by the 31,231 stations abandoned represents 26.2 cents per station on the wiring in ten months. Mr. Manson stated that the average substation set is in service about 4.5 years.

COST OF RECEIVER, TRANSMITTER AND INDUCTION COIL.

The New England company does not own the receiver, transmitter and induction coil, which are leased from the American Telephone & Telegraph Co. at 75 cents per year. To estimate the annual charges on this equipment, however, Mr. Manson gave the following prices: Receiver, $1.14; transmitter, $1.50; induction coil, $0.345, total $2.985. Applying 10 per cent. depreciation, 1.7 per cent. taxes and 7 per cent. interest, with current repairs estimated at 20 cents, the annual charges on this equipment total $0.758. These are Western Electric prices to the New England company.

It is estimated that the addition of an extension set tends to increase the calling rate 25 per cent. at the main station, based on a traffic study of about 650 stations. On this basis, the operating room cost per extension station was figured at $1.62 per year, the actual operating expense per main station, including wages of operators and operating clerks, and the cost of schooling, being $6.48. Traffic costs other than operating, 30 cents per extension set per year, include superintendence, service inspection, rest and lunch rooms, central office stationery and printing, water, ice, fuel, light, supplies, care of offices, etc. This is figured on the basis of the 18.4 per cent. ratio which these items bear to the total operating expenses.

Edmund W. Longley, general auditor of the New England company, stated that he has a representative who is in the offices of the Western Electric Co. and sees all the bills of apparatus and supply dealers rendered to the Western Electric. This man verifies the prices at which the bills are rendered to the New England company from these originals and has the right of examination of any records in Boston, to a large extent thus being able to check up prices.

The witness was unable to say that he knew of any direct examination of the Western Electric prices, to determine whether the New England company was receiving prices as low as the most favored customers. The Western Electric agent in Boston is looked upon as the New England company's own agent, and it is assumed that he protects the New England company in his position.

E. K. Hall, vice-president of the New England company, said that there is no question that the latter is obtaining prices as low as anyone from the Western Electric Co. The New England company has made money by virtue of the Western Electric's acting as its purchasing agent. Mr. Hall said that extreme refinements in rate-making are out of the question.

FACTORS CONSIDERED IN FIXING RATES.

"In rate-making," he said, "we take into consideration the value to the subscriber and the value to the whole service. Perhaps I can illustrate that in this way: I suppose there is no question but that residence service is furnished at nearer cost, so far as you can get it, than business service.

"An attempt to work out costs was made in the investigation made under the Massachusetts Highway Commission. The expert whom they employed (Prof. Dugald C. Jackson of the Massachusetts Institute of Technology, Eds.) had a theory that these things could be worked out in costs just the same as you can work out the electric light; but the trouble is that in electric lighting the only man interested in the proposition is the man who gets the light, whereas in the question of telephone service everybody is interested in having it just as gen-

eral as it can be. And the man in Boston is distinctly interested in having telephone service in any community that you can name in the state of Massachusetts.

". . . Even if residence telephones do not pay their full proportionate cost, every time that a residence station is added I take it that it adds a certain value to the instrument on your desk, because some day you may want to get that man and get him quickly. Therefore, we believe that telephone rates should be so adjusted that you can get telephones down as low as our rates are, with cost not absolutely controlling, but so that the largest number of telephones is in service. . . . The original cost of putting in a pay station is not so very much, but that is only one element."

"Two-thirds of the New England company's lines in Massachusetts are now underground," said Mr. Hall, in briefly discussing depreciation. "The composite life of the entire property is represented by a depreciation figure of 5.9 per cent. or about 16 years. The Bell companies are in the strongest position, the speaker said, regarding plant replacement, of any public utilities.

Clarence C. Colby, co-receiver of the Samson Electric Co., Canton, Mass., said that he, with William J. Murdock, has been conducting the business of the Samson company since December 10, 1914. As the receivership will terminate shortly, through a re-organization, the witness' testimony was advanced without any idea of personal gain. The facts set forth in his evidence, Mr. Colby said, have been gathered from men who have been in the telephone manufacturing business over 20 years.

The real cause of the overturn of the private telephone business about ten years ago was a change in policy on the part of the Western Electric and affiliated operating companies. Prior to 1905, the Samson company, under its former name of the Electric Goods Mfg. Co. was selling telephones for private installations at substantially the following net prices:

Catalog No.	Type of Telephone	Net Price
211	Wall telephone	$6.50
212	Wall telephone with writing stand	9.00
127	Desk set with separate ringing mechanism	12.00

Up to this time the Western Electric Co. had refused to sell telephones, its policy being entirely confined to the leasing method; and its annual charge being substantially $10. About ten years ago the Western company changed its policy of leasing and sold the same apparatus to private individuals for interior installations. This change meant that whereas prior to this time a user had the alternative of buying an instrument at about the same price he would have to pay to rent it from the New England company or the Western company, he could now buy it from the latter or from the Samson company at about equal prices. This would have left the matter upon a fair competitive basis, had it not been for the advantage taken by the Western company of its relations with the Bell interests in the following manner:

Bell Policy As to Physical Connection.

A prospective customer would be informed, when in the market for telephones for interior use, that if he installed Western Electric apparatus, that being identical with that used by the New England company for outside service, arrangement could later be made, if outside service was desired, with the operating Bell company to give outside service. This coupled with the decisions in other states at about this period, holding that a public service company maintaining a public telephone system, could properly refuse to attach telephones of other makes to its lines, put the Western Electric Co. in a position to say: "If you buy the other man's goods, the Bell company will never give you outside service. If you buy ours, they will."

In this way the Western company was able in a very few years to greatly reduce the business of the private manufacturers of telephones for interior installations. As the years have gone by, the makers of private telephones for interior use have gradually disappeared, so that today in New England they can almost be counted upon the fingers of one hand. And today, the evidence declared, the few manufacturers still selling private installations of telephones in Massachusetts have to compete against the alliance between the Western Company and the operating Bell company in the manner above described.

This situation could be corrected by legislation permitting the purchase of standardized apparatus for interior installations from other manufacturers than the Western Electric, and requiring that the operating Bell company should connect, when requested, such apparatus for outside service. It would result in putting the extension sets of interior telephone apparatus on a fair competitive basis, which would result in a great saving to the public over the rates now paid. As the fundamental patents upon telephones have expired by limitation and as the manufacturing of telephones for interior installation is not a complicated electrical or production problem, a proper standardizing of such instruments could easily be made, and instruments installed thereunder would in no way interfere with the efficiency of the outside installation of the operating Bell company.

Dual System with Switch-key Connection.

As a concrete example of dual service, reference is made to an installation in a 93-suite apartment house in Milwaukee, Wis., owned by John Desser, vice-president of the American Candy Company, and designed by the architectural firm of Leenhouts & Guthrie, of Milwaukee. This apartment is known as the "Blackstone." The architects, in drawing the specifications for the telephone equipment of this building, specified the apparatus of an Independent manufacturer, whose plant is located in Massachusetts, and Geo. F. Rohn, electrical contractor, of 446 East Water street, Milwaukee, secured the order for the telephone apparatus, and placed the order with the Independent manufacturer for his goods on September 23, 1915.

Shortly thereafter agents of the Wisconsin (Bell) Telephone Co., Milwaukee, interviewed the owners of the apartment house, and as a result of the inducements offered, it was decided to install in place of the instruments of the Independent manufacturer, the "dual system" of the Wisconsin (Bell) company, and the order of the Independent manufacturer was cancelled on October 18.

The "dual system" of the Wisconsin company amounts to the following: In the vestibule is installed a Western Electric vestibule set, and in each suite is installed a regular common battery substation telephone. In this telephone is mounted a cam key. Calls from the front entrance ring on an ordinary vibrating bell, and the tenants answer the front entrance by throwing the cam in a certain position. If the call comes in from the city exchange, it rings on the regular telephone bell, and to answer the call, the key is thrown in the other position. The system is arranged for interior service in the same manner as that of the Independent manufacturer. In addition, by the use of a cam key on each suite telephone, connection may be made for outside service.

George F. Rohn, the electrical contractor who was to have installed the system of the Independent manufacturer, put in two separate sets of conduits, one set being for the use of the Bell company for its wires between the various suites and the telephone company's cable terminals in the basement. From this cable terminal the ordinary lead cable was run by the telephone company to its exchange. The electrical contractor did not install the wires connecting the telephone company's cable terminals in the basement and the suites. This was done by the telephone company. In the second set of conduits between the suites and the front vestibule, the electrical contractor installed the wires for operating the house service, and the owner of the building paid for this installation.

In short, the operating Bell company ran its wires through conduits installed by the owner by his agent from its terminal

to each telephone. The Western Electric furnished the instruments. The owner, by his agent, installed the wires leading from the vestibule to each telephone to be used for interior service. This system provides for a double service. By throwing a cam key in one direction, a connection is made through one set of wires with the operating company's exchange. By throwing it in the opposite direction, a connection is made for the interior service between the vestibule and the suite.

This service was offered on the following basis:

The maintenance of the outside service line is taken care of by the Bell company. The maintenance of the house service is cared for by the Bell company and charged for at a certain rate per year. The service charge for this equipment is paid for by the owner to the Bell company at the minimum rate of 25 cents per telephone per month, and no extra charge is made for the house service.

This system has been installed in many apartment houses in Cleveland and in other cities of the United States. It would be a very simple matter for an operating telephone company to install on its main station in a building a cam key, to permit the connection of interior service with the regular outside service. And if the public were permitted to own and equip their homes, offices, hotels, schools, apartment houses, etc., where service is desired with an interior system of standardized equipment, which could be connected by a cam key desired with outside service, it would be able to add considerably to its convenience, and at the same time the expense would be much less over a term of years, than that which it now pays under the present rental basis of extension sets.

Costs of Standard Desk Extension Sets.

A. Cost of Extension Talking Set without Extension Bell.

Desk Stand including base upright, receiver hook and inside springs, purchased from Western Electric Co. at	$1.80
Receiver and cord	.58
Six feet of standard three-conductor cord	.25
Samson No. 70 long distance transmitter with brass swivel connection	.80
Assembling and factory burden	.40
Total cost	$3.83

B. Cost of Extension Bell.

Case	$0.35
1,000-ohm ringer and gongs (Western Electric)	1.30
Two mf. condenser	.45
Wire	.02
Clips and screws	.02
Hinges and screws	.04
Binding posts	.04
Induction coil	.25
Carton for packing	.06
Assembling and factory burden	.40
	$2.93

The above represent the factory costs of the Samson Electric Co., based on the manufacture of 100 instruments at a time. In lots of 1,000 the estimated saving would be 10 per cent. A profit is undoubtedly figured in the portion purchased from the Western Electric Co., and to obtain the true cost this profit should be subtracted. The costs of wall telephones such as are usually installed in hotels and other places would be somewhat below the above aggregate cost, for the reason that the ringing mechanism and telephone apparatus is included in one unit.

It is estimated that the average cost of installing extension sets would not exceed $2.50, and that the average annual cost of maintenance, not including any portion of the switchboard, if this should be the form of the main station, would not exceed $1 per year.

Charles B. Fitts, telephone engineer of the Samson company, stated that the receiver and cord are manufactured by William J. Murdock & Co., Chelsea, Mass.; the standard three-conductor cord is purchased of C. H. McAlvoy, Lowell, Mass.; the transmitter is of Samson make, as stated; and the case of the extension bell is made by C. D. Jones, Boston. Other small material is made at Canton. The total cost of the set complete, figures $6.76. A large portion of the extension equipment required omits the condenser and bell, making the cost $1.75 less, or $5.01 per set. Mr. Fitts said that his experience in installing private systems indicates that 5 per cent. of the initial cost to the consumer is ample for maintenance.

Standardization Urged.

Regarding standardization, Mr. Fitts said: "I think it would be vital to the success of the plan of open competition to have standard apparatus, inasmuch as there would be a field open to the private manufacturer, and a large number of concerns would attempt to put on the market the cheapest thing that could possibly be made, unless there was some board or inspector to pass on the quality of the apparatus and installation to be used in this way—the same as in New York and New Jersey, where it is provided that fire alarm systems may be installed, but before such apparatus can be used they must be approved by the state board, which maintains an engineering department to look after such matters. The conditions should be the same as to standardizing the equipment.

Mr. Fitts thought two or three inspectors would be ample. This would not cover installing or inspecting the apparatus on the subscriber's premises, but simply means passing on the goods from the manufacturer who presents the goods before it can be placed in service. The witness said the factory costs given do not include any profit or selling expense.

On cross-examination by Vice-President Hall of the New England company, Mr. Fitts said that from 8,000 to 10,000 telephones are made yearly at the Samson factory. The majority of instruments are for private line and intercommunicating service and are of the battery call type. No backboard was included in the estimate previously given, nor was a battery box included in the equipment specified. Mr. Colby said that 25 to 33 per cent. above factory cost would give a reasonable margin of profit. For suite and apartment house installations the selling cost is based on 50 per cent. over the factory cost, but if the company were to handle these in a broad development, the former figures would suffice.

Mr. Colby stated further that if the Samson company made up the stand, base, and top, exclusive of the hook, with the springs inside, the cost would be a little over $1, made up in large quantities. Mr. Fitts said that the Samson company's sale for private telephones includes but a small number of instruments requiring long receivers. The watch-case receiver is used on 95 per cent. of the product. The factory cost per receiver is 38 cents. The longer receiver is preferable for long distance service.

Tests Suggested for Standardizing Telephone Sets.

Mr. Fitts said that two or three men could easily test the equipment offered for service by laboratory methods. There are numerous tests. Some bear upon the sensitiveness, to determine the qualities on long distance lines; another feature is the resistance of the transmitter, noting if it will "fry" when a certain battery application is made. Several days would be desirable in which to test each type of telephone submitted, and after the type had been inspected, occasional examinations would give the necessary indication.

The most frequent trouble in transmitters made by independent manufacturers, he said, would be the matter of "frying"; that is, an instrument might not have the proper amount of granular carbon and would give a hissing sound. A good transmitter ought to last 12 to 15 years without developing such a difficulty. Mr. Fitts would not concede that Western Electric receivers and transmitters are as good as any Independent equipment made, although he admitted that taken as a whole, Western Electric apparatus is excellent. Mr. Hall then said that the Bell companies operate only about one-half the telephones of the country.

Mr. Fitts said that he purchases from the Western Electric at a discount of 33 per cent. off the trade list. In some cases the Western Electric Co. has assigned agents, and the discount to them is an extra 10 per cent. on complete telephones for private use only. The witness knew of no further discount. Special agents are expected to push the sale of telephone systems, and the Western company refers to them all inquiries from the private parties who contemplate installing private systems.

Willam J. Murdock, Everett, Mass., a manufacturer of telephone receivers, said that he was the holder of a patent issued in 1900 for a receiver in which the interior parts are so imbedded in the case that they cannot loosen, the case being a permanent, solid unit. He averred that his product is superior to the Western Electric receiver, and said that he manufactures from 60,000 to 70,000 such receivers a year. The price of 58 cents including a cord permits a profit. The long receivers are used in preference to the watch-case type in installations where a heavy receiver is desired to operate the hook switch (about 12 ounces or less), and also because the long receiver is slightly more efficient.

Mr. Manson, recalled to the stand, said that the price to the New England company of the Western Electric No. 20 AL desk stand, including a six-ft. cord, is $1.98. The price is $1.50 for the stand itself without the cord.

William H. O'Brien, chief of the commission's telephone and telegraph department, called Mr. Hall's attention to the present New York Telephone Co.'s measured service schedule of $6 per year per private branch exchange set for the first ten stations; $4.80 for the second ten, and above 20, $3.60. Mr. O'Brien said that this seems pretty well to establish the idea that extension sets upon measured service are a means of revenue producing. Mr. Hall said that these rates should be considered in connection with the rates for switchboard and measured service.

In New York the company has what might be considered wholesale rates for calls, the contracts providing for large quantities. That has never been recognized in New England. The New York reduction appears to be made for what might be called the wholesale installation of extension sets in connection with P. B. X. stations. Within two years the New England company conferred with the commission about making a reduction, later adopted, on measured service, such as making the rate 2.75 cents on calls above 6,000, and then 2.5 cents. But the New York reduction on P. B. X. extension sets has never been put into effect in New England.

Mr. O'Brien said that the maximum equipment at New York, consisting of a monitor switchboard, (limited to seven stations and three trunks) two stations, one trunk and 2,400 local messages per year is $126 per annum. The reduction from $6 to $3.60 would indicate that the proposition is a revenue producer. Mr. Hall replied that these facts pertained primarily to P. B. X. service, and did not feel that reductions would necessarily be justified in ordinary extension set installations.

Regarding the figures submitted by the Independent manufacturers, Mr. Hall said that adding anything like a shop profit, the New England company's costs were lower although the Bell organization estimates over twice as much for the receiver, induction coil and transmitter as the Independents. He vigorously contended that the Western Electric equipment has no superior, and said that the latest transmitter, now beginning to be received, improves the transmission between 4 and 5 per cent. This means thousands of dollars saved in future investment in line copper for the same transmission.

The speaker said that it is a very different matter to make a transmitter which will meet the requirements of local transmission, or of from 200 to 300 miles, and to produce one suitable for 2,000 or 5,000 miles. Mr. Hall said that some of the service with connecting companies results in considerable difficulty, and although the effort is constantly being made to standardize equipment, the service is sometimes very poor.

In closing, Mr. Colby said that he knew of no comparisons of apparatus which were significant. The Samson transmitter, for instance, is absolutely watertight. One can throw it into a pail of water at night and take it out in the morning, and it gives as good service in the morning as it did at night. No cords on the market, however, can be wet in this way. Mr. Colby said that there are points about the Samson transmitter which are very superior to the Western Electric transmitter, and urged that until an examination is made by a competent body, it is unfair to say that one is better than the other and leave it there.

The speaker held that long distance service is not the controlling point. People should have good service, but granting for the moment that the installation is not quite so good, who is the man to know it first? The man who is trying to get Chicago; who is going to the main service station if he can get a better transmitter there. "Suppose the new transmitter is 4 or 5 per cent. better," said Mr. Colby, "why should the public be compelled to pay generally for such equipment to use just among their friends and local business houses? It is not so much a matter of efficiency of receivers and transmitters as it is of the stations and the lines and plant maintained. Running through the stations is what tells you whether you can talk 200 miles or 2,000 to 5,000. It is not the little diaphragm that is as important as other things."

Commissioner Eastman inquired if any comparison of Independent and Western Electric instruments has been made by the New England company, and was informed that none had been made. Such work is being done constantly by the laboratories of the American Telephone & Telegraph Co. The hearing was then closed.

Los Angeles Home Company Not Under Bell Control.

Reports have been circulated in the Los Angeles, Cal., daily press that Bell company has secured control of the Home Telephone & Telegraph Co. of Los Angeles. Officials of both companies deny the report and Joseph Harris, president of the Automatic Electric Co., Chicago, also states that the report is untrue. In denying the report President A. B. Cass, of the Home company, adds the following comment relative to the rise in the stock of the Home company in the past few weeks:

The increase in the value of the stock only reflects the brighter business conditions of the city and the stock market throughout the country. Within the past ten days we have purchased the land and arranged for the construction of a three-story sub-station at Beverly Hills. We have also been doing a good deal of new work in the northwest part of the city. Does this look like we are selling out?

The franchise of the Pacific company expires in November of this year, while the franchise of the Home company has 36 years yet to run. The people at a referendum vote at the last city election instructed the city council to refuse to grant the Pacific Telephone & Telegraph Co. a renewal of its franchise unless it agreed to accept a franchise requiring the interchange with the Home company.

Holding Company to Take Over Santa Barbara Systems.

Announcement was made recently in Santa Barbara, Cal., newspapers of the organization of a holding company to take over and operate the systems of the Home Telephone & Telegraph Co. of Santa Barbara and the Santa Barbara exchange of the Pacific Telephone & Telegraph Co. The consolidated system will operate under the Home franchise and, it is reported, will be controlled by the Bell company.

Goltry, Okla., to Have Municipal Telephone System.

An ordinance was recently passed by the board of trustees of the town of Goltry, Okla., for the issuance of bonds in the sum of $2,500 for the purpose of providing funds with which to purchase and construct a telephone system.

Some Problems

A Letter—An Article—A Story

By J. C. Kelsey

I have a letter on my desk which contains the cry of the small telephone operator. He says, I won't dare to give heed to it because it may prove offensive to some of our larger companies. He is a man who owns his property outright and has had more than one offer exceeding $60,000 for his property.

I am going to quote from this letter, not because I am dared to, but because it may lead to a better understanding between the large and small Independent operator.

We have all watched, with some concern too, the constantly growing list of connected or so-called sublicensee subscribers. We have tried to find a reason why the growth of this list has been so swift.

We have tried to believe that the small Independent has been misled when he connected with the Bell lines and split the business with his old friends. But after reading this letter—a letter from a very intelligent and faithful Independent—I pass judgment up to the industry.

The story "The Battle Cry of Peace," coming out in the December 18 issue and exulting in the junction of the associations, seems to have aroused this man who writes:

If a few small companies had pulled off from the old mother association, not a word would have been said. When the big fellows kick, look at the whole bunch get busy and kill the fatted calf when the wanderers see their folly and return to the fold.

Just because the little fellow can finance his own business on his own hook and play safe, he has to knuckle to the big corporation which has more securities floated than its plants are worth. For that reason if a little fellow asks for his rights, he can't get it because the big fellow will lose money, and it would be disgrace for him to lose.

We have just had a big sleet storm. It was a corker. The little fellow with his so-called rundown plant, with alleged inferior service, had his subscribers all talking and toll lines O. K. on his half of the circuit before the big fellow got started.

Now follows the dangerous factor of the situation. It goes far toward explaining why there has ever been a quarrel between the larger Independent companies and their connecting companies. It goes far toward explaining why the small telephone operator has been ungrateful, as he has been accused.

Whether or not the statement which follows is true, it does explain, or at least reveals, a frame of mind which certainly is dangerous to the large Independent who operates long distance lines:

I believe the conditions would make any man in my position a strictly Bell man. Why? You can give the Independent company a toll call and wait two hours to get a report! We can go to the Bell lines and have the party in a few minutes.

We have called for numbers on the Independent exchanges and have had reports back that no such number or subscriber was listed. Give the ticket to the Bell lines and this very subscriber will be notified over his own telephone that a long distance telephone call awaits him over the Bell lines.

Unquestionably this condition must be over-stated. It stands to reason that the large Independent company certainly knows its subscribers. If such a condition is true, then there is a chance for operators' schools several times during the year. It is a pity that such differences of attitude between telephone men should arise.

We all know it was on account of the success of the larger companies that the Bell company sought connections with the outlying companies. It saw not only the folly of competition with a strong local company, but the necessity of strengthening its large city terminals.

The local successes of the larger Independents gave the small Independent company another outlet, and it took advantage of it with a vengeance.

I certainly know no solution to this situation—nor can the outcome be predicted.

The small operator, as far as the fortunes of competition are concerned, is safe. He has none of the problems which beset the large city Independent who still competes against a concern which is furnished unlimited capital for extensions, solicitation and all the extras. It possibly is a plain case of incompatibility and cannot be remedied by any known process.

The ultimate answer to the question is to be found in what will happen to the small operator when the larger Independent dies through lack of proper or whole-hearted support on the part of its natural allies.

There is also another article on my desk which surely points to a problem.

A Kansas town of 4,000 people has had two Independent telephone exchanges. War between these two companies has been of a merciless variety, and one company finally felt the need of sale to the other. The people petitioned for a merger and were not averse to the payment of a fair rate.

The Kansas commission allowed the following rates under consolidation: Business, $1.50; residence, $1.25; and four-party residence, $1. In return for this generous rate allowance, the company provides free service to the first town removed from the city in any direction.

Now mind you, these rates are consolidation rates. Under the theory of consolidation, the victor has the legal right to charge the cost of the purchase of its competitor to the capital account.

Will anyone explain how losses of such character can be amortized on rates of $1.50 per month for business and $1 for average residence service? Will anyone explain how a telephone company can meet the increasing charges of new materials on such a rate?

There is no telephone condition in the world in a city of 4,000 people which will justify a rate of $1.50 and $1. The world has thought that even the curse and sting of $2 and $1 had been removed, but it remains for a governing body to reverse all tendencies and to go further.

To place a telephone in a business house at $18 a year is about as just as a rule which would make a farm hand work for $6 a month. It goes beyond my understanding why a group of men with the experience of those on the Kansas commission should sign their names to an order, on even the smallest telephone company, to charge $1.50 for business service.

Whatever the truth of the situation is, the fact remains that a nail has been driven into the coffin of commission control. It is in line with the killing of the goose which laid the golden egg, or the destruction of productive forces which keeps one alive.

The railroads were ground down and down until the time came when the railroads had to be restored and some of the transportation fabric saved to the public. Cities do not muddy the water in the reservoirs; they make every effort to clarify and purify it. But they do not hesitate to try to muddy the water of a service equally important to them.

Congressmen can predict telephone calls for a penny, and

telegrams for two cents, but the fact remains that they are only raising the pendulum higher so that the reaction will only go farther the other way.

A group of psalm-singing Sunday-school delegates, keeping pagan sleepers awake all night by their howls, only serves to make God ridiculous.

Congressman who predict penny messages and commissioners who order $1.50 business rates, only serve to make government ownership and control ridiculous. They speed the day when all men are turned loose once more to see which is the survivor of the fit.

Men pay more for railroad fare and they pay higher freight charges, simply because the power of some people to control these charges unjustly, made the situation ridiculous. The same condition applies to the telephone industry because men are seeking to make the present regulatory power a thing too ridiculous for human beings to preserve.

Last of all is an article in the Wall Street Journal on the problems of the Bell interests. The key to the whole story is this: "The trend of telephone rates has been steadily downward for many years, and the fall has been especially rapid during the past years."

In addition to this fact is another factor—that of "increasing expense." Wages have risen from $490 to $656. Everyone knows that more money is being paid to employes than ever before. The man who beats your carpets has as much pride in his wage increase as any other man.

The operator has been paid more money because little factories in your towns have such signs as this: "Girls! If you are not earning $12 per week, come to see us."

You know the answer, so does every man if he will but admit it.

Look at Bell income for a period of years:

1900	$57.28	per station
1910	40.75	per station
1913	39.48	per station
1914	38.41	per station

It is easy to explain the stage between 1900 and 1910—it was due to competition which compelled the general use of the telephone in all quarters. The choice business years which paid an average $50 or $60 a year in advance, became mixed up with the service which paid from $18 to $30 sometime during the quarter.

It is a tradition that the Duluth Bell closed its books on January 2 because the day before, every telephone bill of $54 per year had been paid in advance.

The period from 1910 to 1914 is harder to explain because the increasing use of long distance service should hold level the tendency of the rentals to reduce as the service was extended.

Undoubtedly the abolition of localities which give $9 rates to sustain terminals, would help matters. Such a locality as Galesburg offers Bell service at $9 per year because some brand of false pride insists upon a costly terminal.

Honestly, don't be sorry for the telephone business until it eliminates every dollar of its cut-throat income. It is better to swallow terminal pride and accept a successful Independent as a successor, than to go on, year by year, taking a loss.

Some day the Galesburgs, Cantons and countless other red ink spots will be voluntarily cast from Bell books.

The tendency to strike at a corporation seems habitual. Just why, no one knows. It is just like striking at the hand which feeds you. Corporate form gives us the simplest and most effective method of conducting business.

The telephone business is one peculiarly susceptible to corporate form since it is a business that never stops growth. The problem of serving every individual, even involuntarily, is ever before it.

Why it should be punished by being compelled to live on short rations is more than one can understand, unless he is a politician willing to serve his country at a price which so far no one has seen fit to reduce. There are no $1.50 rates in the lives of governing bodies.

Possibly the telephone business has developed its own peculiar diseases. It now must develop a remedy, not only to alloy the disease but to let the patient get up and go to work.

Every telephone man knows he will soon pay higher prices for his materials and help, even though they seem mountain high now. This is the time for all able-bodied men to come to the aid of the telephone business by deluging the governing bodies with rate applications.

So long as telephone men go about raises in the present desultory fashion, we may expect $1.50 surprises. There is no doubt that concerted action will be taken when future costs will be fully realized.

MORAL: You must take care of interest and rust.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies, Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Hearing on State-Wide Investigation in Washington.

Hearing was begun at Tacoma, Wash., on January 24, by the Washington Public Service Commission on its investigation of the Pacific Telephone & Telegraph Co.'s operations in the state with a view of establishing a fair valuation upon which equitable rates can be based. The hearing will probably last about a month.

A. E. Boyle, telephone engineer, and J. C. Simpson, public accountant, took the stand at the morning session and were examined long enough to identify and put into evidence 152 volumes of statistics for the state.

When examined, A. E. Boyle, for the state, explained how the valuation of the company's property had been arrived at. He said that the valuation had been figured out on an inventory submitted by the company, which contained all of the equipment, the buildings, cost of reproduction, depreciation and the average cost of labor during the last five years.

Costs of rights-of-way, engineering, taxes, overhead expense and cost of financing the system were also included in the estimate, the witness stated. It would cost approximately $6,375,100 to replace the telephone systems in Tacoma, Spokane and Seattle, Mr. Boyle said.

J. C. Simpson also told of the manner in which he had compiled the data in the commission's report.

The work now being done is the culmination of an attempt made several years ago by the old railroad commission to establish the valuation of the company's property. The present public service commission is holding the hearing on its own initiative, following, however,

various complaints that have been made regarding excessive telephone rates.

Evidence for the telephone company was introduced and identified at the afternoon session by representatives and attorneys for the company.

According to the inventories and appraisals submitted by the commission and the Pacific telephone company, there is approximately $10,000,000 difference in the respective valuations. The estimates are figured on the amount it would cost to reproduce the telephone system as it is today. According to the report of the commission, the estimated reproduction cost of the system is $16,765,383. As compiled by the company, the cost of reproduction is $26,892,700. The company's estimate contains figures for overhead expense, losses from operation and interest during development that are not included in the report of the commission. A loss of $1,366,800 is ascribed to losses from operation and $4,251,600 is listed as interest during investment.

According to the findings of the commission, the total actual cost of the entire Pacific Telephone & Telegraph Co. in the West is $96,963,078, as shown by the company's books at San Francisco. It was found that approximately 19.689 per cent. of this property was in Washington. Using this as a basis for finding the valuation of the company's holdings, the company's total amount invested in this state is placed at $16,542,451. This is approximately $233,133 less than the new estimated reproduction cost as compiled by the commission's engineers.

Keokuk (Iowa) Rate Ordinance Declared Void.

The ordinance passed by the city of Keokuk, Iowa, on August 12, 1913, which provided for the regulation of telephone rates and prohibited the operation of the telephone plant without first obtaining a franchise, has been declared to be in no way binding on the Iowa Telephone Co., and the city of Keokuk has been permanently enjoined from enforcing it, by a decree which was handed down recently by Judge Martin J. Wade in the federal court.

Judge Wade holds that the telephone company has a perpetual right or franchise, since it compiled with certain provisions of the code of Iowa, and the amendments thereto.

The decree sets out that in 1883 the Western Telephone Co. erected a telephone exchange in the city of Keokuk and occupied the streets, alleys and public grounds. Section 1324 of the code of 1873 and amendments known as chapter 104 of the 19th G. A. were the statutes under which the company was organized, and began its career in Keokuk. Prior to August, 1896, the Central Union Telephone Co. acquired the plant by deed of conveyance.

In August, 1896, the Central Union conveyed to the Iowa Telephone Co. the plant, including the telephone exchange, lines, franchises and other properties.

It holds that by virtue of said statute of the state of Iowa and in the said deed of conveyance the complainant on the date aforesaid acquired, and it has since September 1, 1896, possessed and now possesses and has vested in it the right in perpetuity to own, erect, maintain and operate its said telephone lines, system and exchange, in said city and in streets, alleys, public yards, etc., subject to state laws.

The decree declares the Keokuk ordinance invalid when it states:

"That the certain ordinance of the defendant city of Keokuk enacted on or about August 12, 1913, known as ordinance No. 423 and entitled 'an ordinance to regulate and fix rates and rents for use of telephones and to prohibit the operation of telephone plants without first obtaining a franchise to so operate,' be and the same is hereby declared void as to the complainants, the Iowa Telephone Co., and its grantees and successors, and to be in no manner binding upon the complainant, and the city of Keokuk is hereby perpetually enjoined and restrained from putting it into effect."

This decision practically closes the suit which was commenced following the passage of the ordinance by the city council to regulate the rates charged for service.

Exchange of Telephone Properties in Michigan.

The Michigan Railroad Commission, on December 31, granted the joint application of the United Home Telephone Co., of Muskegon, Mich., and the Michigan State Telephone Co. for authority to enter into an agreement to exchange certain properties in Ottawa, Newaygo, Muskegon, Lake, Manistee, Oceana and Mason counties.

In the tentative contract between the petitioners, which the commission has approved, definite agreed values have been placed upon the several properties to be exchanged and the larger value of the Michigan State company is $153,689, which the United Home company agrees to pay to the former company.

In its ruling, the commission ordered that the Citizens Telephone Co., of Grand Rapids, the Michigan Independent Telephone & Traffic Association, and all other telephone companies operating in the state, have, possess and enjoy the same facilities for connections and transmission of messages to, from, through and over the exchanges and toll lines of the consolidated properties, that any of such companies now have with the United Home Telephone Co. in the territory to be exchanged. It is further ordered that all of the said Independent companies and their patrons have, possess and enjoy all of the same facilities, both as to quantity and efficiency, necessary for connections and transmission of messages to and from all of the patrons of the Michigan State Telephone Co. and its associated companies in the territory to be exchanged, enjoyed before the issuance of this order.

Regarding the routing of toll messages, the commission orders that in all of the exchanges and toll stations of the Michigan State company in the territory in question, if Independent connection is wanted by any patron the connection must be made with the lines of Independent companies at whichever junction point is most desirable, taking into consideration natural routing and efficiency of service. The city of Grand Rapids and the village of Baldwin are the junction points. In case the party wanted can be reached directly only by means of a telephone connected with an Independent exchange, then the message must be delivered over the lines of the Independent company and connection made with the Independent company at whichever one of the junction points previously referred to is most desirable. If requested by the patron, service is to be furnished over Independent companies' lines or the Michigan State company's lines, if practicable.

It is further ordered that the Michigan State company shall give to all Independent companies operating in the southern peninsula of the state, the same facilities, improvements in apparatus, quality of service, rates, etc., from the subscribers in its consolidated territory, as it gives to the patrons of the Michigan State and associated companies.

In conclusion the commission states:

"It is the intent and purpose of this commission, in granting this order,to provide for, preserve and protect and perpetuate the interchange of telephonic messages between all the present and future subscribers and patrons of said petitioners, and associated companies and their successors. . . ."

Pole Lines Over Railroad Rights-of-Way in Kentucky.

Contentions of the Western Union Telegraph Co. in its controversy with the Louisville & Nashville Railroad Co. over the use of the latter company's rights-of-way for

its pole and wire systems have been sustained by Judge Walter Evans, in the federal district court, at Louisville, Ky. Judge Evans held that in the first place it is necessary for the telegraph company to appropriate a portion of the rights-of-way of the railroad in order to carry on its business of serving the public. In the second place he held that the presence of the poles, lines, cross arms and other paraphernalia as ordinarily constructed by the telegraph company along the railroad right-of-way did not interfere with the ordinary use, traffic or travel on the railway.

Judge Evans' decision followed nearly a week of testimony taking and argument. It will be followed by a jury trial which will determine the amount of damage the Western Union shall pay the railroad for the use of its property or whether any damages should be paid. This phase of the case is to begin on Tuesday, February 8. At present Judge Evans has before him a motion of the Western Union that the members of the jury be taken over the entire right-of-way which the Western Union is seeking to condemn so that the members of that body may get into closer touch with the actual situation. If this motion is allowed the Louisville & Nashville will provide a special train and it is expected that at least four days will be spent on the road.

House Mover Not a Servant of Telephone Company.

The Minnesota Supreme Court has sustained the action of the district court in the case of Coller vs. Bingham Lake Rural Telephone Co., a suit for damages for injuries sustained by the plaintiff by the breaking of a telephone pole which he had climbed to remove the wires in order that a house which he was moving might pass.

The district court which was sustained by the higher court held that:

1. Moving a house along a village street is not using the street for the purpose of ordinary travel; and the statutory requirement that a telephone company shall locate its lines so as not to interfere with the safety and convenience of ordinary travel does not make it the duty of the company to remove its wires from the street to permit the passage of a house along the same.

2. Where a house mover, with the consent of the company, removes such wires to permit the passage of the house, he is acting in furtherance of his own business, not in furtherance of the business of the company, and is not the servant of the company, but a mere licensee.

3. A suit for damages against the company brought by such house mover on the ground that he was a servant of the company and was injured by the breaking of a rotten pole which he had climbed and from which he had cut the supporting wires—the defect in the pole being unknown to the company—was properly dismissed for the reason that he was only a licensee and not a servant of the company.

Bill for State Control of Telephones in Kentucky.

A bill which would place telephone, telegraph, steamboat and express companies under control of the state railroad commission, has been introduced in both houses of the Kentucky legislature, and is said to have the support of Governor Stanley. Robert T. Crowe, of Lagrange, is behind the measure in the house and Webster Helm, of Newport, is behind the measure in the senate.

In the preamble it is set forth that the bill shall not apply to the "operation of telephone companies conducting business wholly within any city where the rates of toll may be regulated by local authority." The state railroad commission would act as arbitrator in all differences relating to rates or quality of service arising between the public and the public service corporations. It requires that schedules of tariffs be published, showing all the fares, rates and charges of toll, etc., copies to be kept for ready access of the public. No changes may be made in these rates without 30 days' notice to the commission and public.

The Combs bill, providing for vote on a constitutional amendment to permit merger of competing telephone companies, has passed the senate and is now before the house.

Status of Austin, Texas, Merger Proposition.

A number of conferences were held during January between the city authorities of Austin, Texas, and Vice-President J. E. Farnsworth and other officials of the Southwestern Telegraph & Telephone Co., concerning the proposed merger of the two telephone exchanges in Austin. The Southwestern company has agreed to purchase the Independent exchange in Austin, and to erect a new office and exchange building in that city, merging the two exchangee, providing the city will amend the company's franchise and allow a rate of $5 on business telephones.

Representatives of 2,000 rural telephone users, subscribers of about 20 rural companies operating in the vicinity of Austin, and maintaining free connections with that city, appeared before the city authorities January 20 and asked to be assured that the merger would not affect their service into the city. This assurance being given by the telephone company, the rural companies announced themselves in favor of the merger. The Ministerial Association of Austin presented the question of a minimum wage for operators, asking that a minimum salary of $10 per week to female employes be guaranteed by the telephone company in the event of a merger. The question of putting the proposition up to a vote of the citizens of Austin was also discussed.

Mayor Wooldridge and the city commission are considering the matter from all standpoints, and expect to take some definite action early in February. Austin, which is the capital of Texas, has a population of about 40,000.

Mr. Farnsworth notified the city council on January 29 that his company would not accept a franchise from that city authorizing the merger of the two telephone exchanges there if the minimum wage clause submitted by the Ministerial Association were incorporated therein.

Ordinance for Sale of Chicago Automatic Recommended.

The ordinance authorizing the sale of the automatic telephone system owned by the Illinois Telephone & Telegraph Co., to the Chicago Telephone Co., was recommended for passage by the council committee on gas, oil and electric light at a meeting held the latter part of last week. The principal features of this ordinance were set forth in TELEPHONY, of January 22.

A campaign to prevent the sale of the automatic property to the Bell interests has been launched by the Public Ownership League, a subsidiary organization of the Chicago Federation of Labor. The league is endeavoring to influence the council to have proceedings started to confiscate the automatic property.

Probable Settlement of Litigation in Frankfort, Ky.

The Frankfort (Ky.) city council is considering a proposition of the Cumberland Telephone & Telegraph Co., which looks toward compromise of the litigation between the city and company. It provides that the city recognize the existence of a franchise extending for 30 years and grant the company a franchise thereafter for 20 years. The company's proposal is, if these provisions are agreed upon and an increase of from 35 to 75 cents in rates approved, to spend $109,000 in improvements which would give Frankfort a strictly modern plant. At present the company holds what the courts have held to be a perpetual fran-

chise and a perpetual injunction against the city to compel it to leave the company's property alone.

Valuation of Telephone Properties in Minnesota.

A valuation of the properties of telephone companies to determine the reasonableness of rates will be started this year by the Minnesota Railroad & Warehouse Commission, according to a statement made by I. B. Mills, chairman of the commission.

Dissatisfaction has been expressed throughout the state with the railroad and warehouse commission as a result of the increases in toll rates made by the telephone companies prior to the new telephone act becoming effective on July 1. The commission is powerless to stop any increase in rates until the survey is made, Mr. Mills said.

The survey will take two years and will cost approximately $40,000.

Seeks to Set Aside Physical Connection Order.

The Farmers Mutual Telephone Co., of Columbia City, Ind., has filed action in the Whitley circuit court to set aside the order of the commission requiring a physical connection of its lines with those of the Whitley County Telephone Co., which also operates in Columbia City.

Recently the Mutual company asked the commission to set the amount of damages on tolls and switching which it claimed would result if the connection were made. The commission, which had ordered the connection several months ago, refused to do this; recommending that the companies make the connection and that the commission would fix the amount of damages after the connection had been experimented for six months. The Mutual company new seeks to set aside the commission's order.

Summary of State Commission Hearings and Rulings.

COLORADO.

February 14: Continued hearing on state-wide investigation, upon the commission's own motion, of the Mountain States Telephone & Telegraph Co. with a view of determining the reasonableness of its rates, regulations, etc.

IDAHO.

January 21: Hearing on the complaint of the city of Coeur d'Alene, Idaho, vs. the Interstate Utilities Co., alleging excessive telephone rates and poor service.

ILLINOIS.

January 27: Union Telephone of Elliottstown was given permission to change rates so as not to discriminate in favor of stockholders.

January 27: Joint agreement between receivers of Central Union Telephone Co. and O. W. Stubblefield, doing business as the Ipava Central Telephone Co., to operate lines in connection with each other, approved.

January 27: Physical connection ordered in the case of the reorganization committee of the Western Illinois Telephone Co., of Macomb, vs. the Prairie City Farmers Telephone Co., of Prairie City, connection to be made within 30 days and complainant company to pay the costs.

January 27: Gillespie Home Telephone Co. given permission to increase rates of service at Benld.

February 2: Hearing in the case of Wm. H. Bentley, of Pontiac, vs. the Automatic Home Telephone Co. and the American Telephone & Telegraph Co., on a petition for an order requiring physical connection between the systems at Pontiac.

February 2: Hearing on application of Southwestern Bell Telephone Co. for an order permitting it to keep its books, accounts, papers and memoranda in the city of St. Louis, Mo.

INDIANA.

February 1: Hearing on application of the Jasper County Telephone Co. for permission to charge $1.25 for full metallic service in Rensselaer, Ind.

February 1: Hearing on complaint of the Martinsville (Ind.) Chamber of Commerce against the Martinsville Telephone Co., alleging poor service.

KANSAS.

December 10: Order denying the application of the Hays Telephone Co. to adjust rates at Hays, Kan. Case No. 1042.

December 14: The commission granted the application of the Plains Telephone Co., of Plains, Kan., for authority to issue its note for $3,500.

January 12: Order granting authority to H. B. Fallgatter to sell the Oakley (Kan.) Telephone Co. to J. W. Matousek, of Esbon, Kan. Case No. 1178.

January 24: The commission dismissed the complaint of the Jetmore Telephone Co. vs. the Hanston Telephone Co., relative to toll rates, at the request of the complainant.

January 24: The commission dismissed the complaint of W. F. Weltmer, of Smith Center, vs. the Hummer Mutual Telephone Co., at the request of the complainant, the subject matter having been satisfactorily adjusted by the Mutual company.

February 10: Hearing on application of the American Independent Telephone Co., of Holton, Kan., for permission to abrogate certain contracts. Case No. 1118.

February 10: Hearing on application of the American Independent Telephone Co., of Holton, Kan., for permission to discontinue free service with certain exchanges. Case No. 1119.

February 24: Hearing on application of the Missouri & Kansas Telephone Co. for authority to change rates in the city of Wellington, Kan. Case No. 1153.

MICHIGAN.

January 20: The commission ordered the Chesaning (Mich.) Home Telephone Co. to make physical connection with the Union Telephone Co., of Owosso, for long distance service.

March 1: Final hearing of the Michigan State Telephone Co.'s application for metered rates in the Detroit metropolitan zone.

MINNESOTA.

February 8: Hearing in the case of the Fulda (Minn.) Telephone Co. vs. the Northwestern Telephone Exchange Co. relative to terminal charges.

MISSOURI.

January 20: The commission authorized M. D. Rogers and I. N. Rogers, of Lathrop, Mo., to sell and D. G. Gray to purchase the property of the Clover Leaf Telephone Exchange at Lathrop, Mo., at an agreed price of $14,000. Case No. 865.

January 26: Hearing on application of the Home Telephone Co., of Joplin, Mo., for a permanent increase in rates.

NEBRASKA.

January: The commission issued an order allowing the Lincoln Telephone & Telegraph Co. to increase its farm line switching rates at Seward and Milford, Neb., from 25 to 50 cents a month, payable quarterly in advance. In order to come in under the 50-cent rate, it is necessary that each farm line must have at least six telephones.

January 25: Hearing on application of the Lincoln Telephone & Telegraph Co., to revise its rates at Clay Center, Neb.

NEW YORK.

February 2: Hearing of the complaint of George G. Hopkins, Jr., and others of Jonesville, Saratoga county, against the New York Telephone Co. as to increased rates.

February 2: Hearing in the matter of the inquiry by the commission relative to certain charges of the New York Telephone Co.

OHIO.

January 27: Hearing on complaint of T. R. Plank, M. Farnsworth, A. H. McKitrick, E. A. Wiley, D. H. Sloan and others against the Star Telephone Co., of Ashland, Ohio. Excessive and discriminatory rates and inadequate service are alleged.

OREGON.

January 22: Application filed by the Pacific Telephone & Telegraph Co. for permission to discontinue its station at Government Moorings, between Portland and Linnton. The company declares that the station is no longer needed, as the service is supplied from the Portland exchange.

PENNSYLVANIA.

January: Hearing on application of the Cumberland Valley Telephone Co. for physical connection with the Perry Telephone Co. through its Newport exchange.

SOUTH DAKOTA.

January: Order requiring the Conde (S. D.) Telephone Co. to enter into a contract with the Dakota Central Telephone Co., of Aberdeen, S. D., for toll connections.

January: The commission ordered the Olean Telephone Co. to restore connections with the telephone on the farm of Peter Hanson at Turton, which was disconnected owing to a dispute between Mr. Hanson and the owners of the Olean Telephone Co.

February 2: Hearing at Iroquois on application of the Banner Telephone Co. for permission to increase its rates.

WASHINGTON.

January 24: Hearing begun on state-wide investigation, on motion of the commission, of the Pacific Telephone & Telegraph Co. with a view to establishing a fair valuation upon which equitable rates can be based.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

296. Is the force acting to restore the alternating current relay armature to normal, strong or comparatively weak?

297. When the armature of the relay shown in Fig. 123 swings in a horizontal plane, is it restored by gravity or by spring tension?

298. What is the purpose of the iron shell used on relays of the type shown in Fig. 123?

299. Why is the drop type of alternating current relay very certain of operation with alternating operating currents?

300. Is it allowable to assume that all relays having the same resistance will show the same efficiency in operation?

301. How is the number of turns possible for any given winding space determined?

302. When the diameter of core, diameter of finished coil, size of wire and number of turns are known, how is the resistance calculated?

303. Why is the actual number of turns less than the calculated number for any given set of conditions?

CHAPTER XV. Coil Windings (Continued).

304. *Another 500-ohm relay winding.*—In Fig. 127 is shown the principal dimensions of another standard relay spool. In this case, the area of the winding space is only 1¾ inches times 3/16 inch or 21/64ths (0.328125) square inch. Assuming that this coil is wound with No. 37 B. & S. single silk insulation the winding data may be calculated as follows:

The outside diameter of No. 37 B. & S. single silk insulated wire is approximately 0.006753 inch. The space, therefore, that must be considered as laid aside for one wire in the winding space is the square of 0.006753 or 0.0000456 square inch.

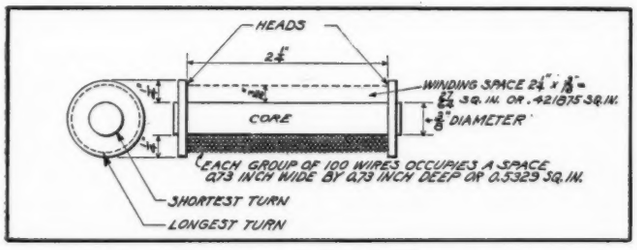
HEADS
2¼"
WINDING SPACE 2¼" x 3/16"
CORE
DIAMETER
EACH GROUP OF 100 WIRES OCCUPIES A SPACE .073 INCH WIDE BY .073 INCH DEEP OR 0.5329 SQ. IN.
SHORTEST TURN
LONGEST TURN

Fig. 126. Illustration of Coil Winding Dimensions.

The number of turns that may be placed in the winding space shown in Fig. 127 is, therefore, equal to 0.328125 square inch divided by 0.0000456 square inch or 7,196.

Since the average turn is the same length as it was found to be in Fig. 126 (1.7672 inches), the total length of wire used in *this* coil is equal to 7,196 times 1.7672 inches or, when reduced, 1059.7 *feet*. The resistance of No. 37 B. & S. copper wire at ordinary temperatures is .5222 ohm per foot. Hence the resistance of the coil described would be equal to 1.059 times 522.2 ohms (the resistance of 1,000 feet) or about 553 ohms.

305. *Ampere turns secured by this winding.*—Assuming, as before that the relay coil is to be worked at a voltage of 12

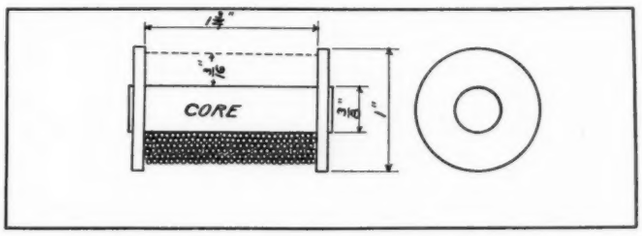

Fig. 127. Short Relay Spool Winding Dimensions.

volts and that this voltage is to be impressed on the coil, it is clear that the ampere turns obtained would be equal to 12 times 7,196 divided by 553. If this is worked out, it will be found that the ampere turns secured under the conditions outlined, are 156 or approximately 41 less than were obtained in the coil shown in Fig. 126. The resistance, however, in the two cases is about as near alike as it would be possible to wind the coils if the wire were laid on in distinct separate layers and each layer *fully* completed over the entire length.

If the coil shown in Fig. 126 should be increased in resistance to exactly 500 ohms by winding on more of the same wire, the number of turns would be increased in greater ratio than the ampere turns would be decreased. In that case the ampere turns would be decreased to 195. Should the resistance of the winding shown in Fig. 127 be reduced to exactly 500 ohms by omitting some of the outside turns, the ampere turns would actually be *increased* to approximately 160.

In these cases there are two relays of standard design, one wound with No. 36 wire and one wound with No. 37 wire. The resistance in both cases is exactly 500 ohms but the short relay, wound with No. 37 wire, will only have available for its operation 160 ampere turns, while the other, wound with No. 36 wire, will have available 195 ampere turns. It is clear, therefore, that the resistance *alone* of any relay winding is no indication as to its operating efficiency.

Since the ampere turns of the winding determine the magnetizing force, and the magnetizing force determines the number of magnetic lines of force produced in the relay armature, core, and air gap, the only proper guide as to the relative efficiency of different relays under any given operating condition is found in a comparison of their general structure and ampere turns. This is qualified by the fact that different relay

structures have different types of magnetic circuit. The various types of magnetic circuits will not be found to have the same magnetic reluctance. Since telephone relays are, however, designed to operate with the *least* current that is likely to be encountered at any time in that part of the circuit where they are found, it is absolutely necessary that, under *average* conditions, they have available an excess of magnetizing force over and above the actual minimum requirements.

306. *Comparison of the windings of relays of the same type.*—In relays of the same structure, the ampere turns will evidently be inversely proportional to the resistance and directly proportional to the number of turns. When relays of the *same design* are to be compared, therefore, they may be assigned a relative value equal to the number of turns in their windings divided by the resistance. For instance, assume that the relays in Fig. 126 and Fig. 127 were of the same size but had 7,900 and 7,200 turns respectively. If the resistance of the first was 480 ohms and of the second 550 ohms, their relative operating value would be 7,900/480 and 7,200/550 or about as 16.5 is to 13.1.

307. *Actual methods of designing windings.*—It must not be thought that the illustrations are intended as an explanation of the method actually used in designing relay windings. The object of carrying through the theoretical calculations is solely to illustrate the principles involved in a determination of operating efficiency, by making comparison between the value of the relay winding in ohms and its value from an economical operating standpoint.

308. *Calculation of turns in winding.*—It has been shown that in order to properly determine the relative efficiency of relay windings for the same frame, core, armature, and air gap, it is necessary to know the resistance and the number of turns. The relative value of any two relay coils, as far as the operating efficiency is concerned, is directly proportional to the number of turns in the winding and inversely proportional to the resistance. In other words, if the number of turns in any two relay coils are divided by their respective resistances in ohms the results will be in the same ratio to each other as the operating efficiency of the two *coils*. The resistance of any given relay winding is *always* known or may be easily determined. The problem of fixing the relative value of relay windings becomes, then, a problem of determining the number of turns in the coil.

Assume, for illustration, that the relay has a resistance of 500 ohms and that it is wound with No. 36 B. & S. copper wire. The nature of the insulation is not, for the moment, important. The external diameter of the finished coil may very well be ¾ of one inch. The core may well have a diameter of ⅜ inch. If the conditions outlined apply to the relay in question, it is true that the length of the average turn (regardless of the size of the wire used) is equal to the circumference of a circle whose diameter is the average between ¾ inch and ⅜ inch. Such a circle would have a diameter of 9/16 inch and a circumference of 1.7672 inches.

But it has been assumed that the relay in question has a winding of No. 36 B. & S. copper wire. Now there are 2.414 feet to the ohm of No. 36 B. & S. copper wire. A wire measuring 500 ohms of this size will, therefore, have a length of 500 times 2.414 or 1,207 feet. But it has been shown that the *average* turn on the coil in question has a length of 1.7672 inches. Therefore, the number of turns in the coil is equal to 1,207 feet (14,484 inches) divided by 1.7672 inches or 8,195.

The number of turns determined in this way, divided by the resistance in ohms, is a very good indication of the efficiency of the relay winding. It is true that the magnetic circuit design also has an important bearing upon the operation of the relay. Poor magnetic circuit design, however, means that in order to accomplish the same results, a *more efficient winding* must be provided than would be the case were the magnetic circuit more carefully worked out. It is evident that the value of the design of the magnetic circuit of any relay must be judged as a separate element of the relay structure.

309. *Enamel wire.*—The insulations commonly used on wires for magnet windings are single silk, double silk, single cotton, double cotton, combinations of cotton and silk, enamel and enamel in conjunction with any one of the others. In cases where the only function of the insulation is to prevent adjacent layers of wire from making contact, the single covered wire has been commonly used. Whenever there is a considerable difference of potential between adjacent turns, it is more in conformity with a conservative design to use the wire with one or more coverings. The advantage of enamel wire lies in the fact that the copper occupies a relatively *larger portion* of the *entire space* required by the finished wire.

It has been found that the use of enamel wire is to be recommended in nearly every case, on account of the greater economy in winding space that its use makes possible. In any given coil wound with No. 36 B. & S. copper wire insulated with double silk wrapping, about 70 per cent. of the winding space is required by the silk and only 30 per cent. is occupied by the *useful* copper. Should the same coil be wound with enamel wire of the same gauge, only about 20 to 25 per cent. of the winding space would be occupied by the insulation, leaving 75 to 80 per cent. for the useful copper. The practical result in this case, or in any other similar one, would be the possible increase in the *number of turns* of the same size wire or the use of the same number of turns of a *larger size* and lower resistance.

Either result would offer advantages peculiar to the individual problem to be met and in no case could the use of enamel wire cause any disadvantages to appear except such as might be due to trouble caused by the current jumping the *too narrow* separation of adjacent turns in the winding. In the case of windings whose adjacent turns are subjected to high differences of electromotive force it is necessary to provide an actual separation between adjacent turns regardless of the character of the insulating covering on the wire.

In the manufacture of enamel wire the bare wire is drawn through tanks containing the semi-liquid enamel. From these tanks the wire passes to the ovens where the enamel coating is baked in its place. The operation is repeated until the desired thickness in successive coats has been placed upon the wire. The essential qualities in enamel insulation are mechancial strength, flexibility, chemical stability and physical permanence, elasticity and reasonable ease of removal for splicing. Enamel wire is much more likely to be injured under unfavorable mechanical treatment than is wire insulated otherwise. It is necessary to use especial care in winding it and its use is not common, for this reason, in coils having square corners and sharp angles. *(To be Continued)*

[EDITOR'S NOTE: In Section 302, page 31, TELEPHONY of Jan-

uary 29, 1916, a typographical error appeared. The length of the average turn in a coil having a core 3/8 inch in diameter and an external diameter of 3/4 inch was given as 1.17672 inches. This should have been 1.7672 inches as it is the circumference of a circle 9/16 inch in diameter.]

Convention of Sixth District Missouri Association.

The sixth district of the Missouri Independent Telephone Association held its annual convention in the parlors of the Terry Hotel, in Sedalia, Mo., on January 26 and 27, with the largest number attending that had ever been registered at a district meeting in Missouri.

It was the intention to hold an operators' meeting on the 26th only, but owing to the large number in attendance —over 60 being present—it was decided to continue the meeting on the 27th.

The convention was called to order by President W. R. Journey, of Higginsville, and Secretary S. R. Smith filled his office. After the address by the president, W. W. Johnson, secretary of the Missouri Telephone Association, delivered a talk on courtesy and promptness on the part of all employes, after which a motion was made and carried to the effect that this association recommends:

That the specifications for overhead railway crossings now being considered by the wire-using companies, railway companies and the public service commission, make use of brackets on crossing spans where not to exceed two wires constitute the spans.

That the wires be dead-ended on brackets.

That double brackets be used.

That guard wires be included.

After the adjournment of the morning session the members attended the noonday luncheon given by the Sedalia Chamber of Commerce, at which S. R. Smith acted as toastmaster. Addresses were made by Mr. Roberts, city counselor, and others in attendance.

At the afternoon session M. L. Golladay, of Holden, gave an interesting talk on "Collecting Farm Line Switching Fees, Etc.," and a general discussion ensued in which many participated.

"The Public Service Commission and Its Relation to the Telephone Companies," by W. W. Johnson, was the opening address at the Thursday morning session, after which a paper by Meddie Hanks, of Higginsville, on "Simple and Necessary Records for a Local Exchange," was read. This paper which was very interesting and instructive, will be published in full in a future issue of TELEPHONY.

J. M. McShane, chief accountant, for the Missouri Public Service Commission, explained methods of bookkeeping and making of reports for Class D companies.

At the afternoon session C. A. Bennett, general auditor of the Gary Properties, of Kansas City, Mo., discussed accounting systems for Class C and Class D companies.

The nominating committee, consisting of M. L. Golladay, S. T. Neil and F. Holmes, then presented their report, as follows: President, Bert Wright, Cole Camp; vice-president, H. C. Houstin, Pleasant Hill; secretary, S. R. Smith, Sedalia; treasurer, H. Harrison Simpson, Pilot Grove. Executive committee: L. S. Arnie, Otterville; Willis Smith, Sweet Springs, and J. Creig, Knobnoster.

The report of the nominating committee was accepted and the officers and members of the executive committee declared elected as given above.

The operators' meeting was in charge of A. J. Shands, superintendent of the Kinloch Telephone Co., and H. E. Gwilliam, traffic superintendent of the Kansas City Home Telephone Co. F. E. Penfield, traffic superintendent for the Missouri & Kansas Telephone Co., Kansas City, was present also. A paper on the subject of "Operating" was read by Mrs. Lulu Anderson, of Higginsville, Mo. This paper will appear in a later issue. It was decided to hold these operators' meetings throughout the entire state, and at such intervals as was thought necessary. There was a registered attendance of over 130.

Bell Official Denies Negotiations for Merger in Dallas.

President H. J. Pettingill, of the Southwestern Telegraph & Telephone Co., while in Dallas, Texas, January 28, emphatically denied that negotiations were under way for a consolidation of the two exchanges in Dallas. "I want to say positively and unequivocally that there have been no negotiations for the sale of the property of the Southwestern company in Dallas to the Dallas Automatic Telephone Co., nor for the purchase by the Southwestern company of the automatic company's property," said Mr. Pettingill. "Such sale or purchase has not been under consideration, nor is it now being considered."

There has been considerable press discussion in the Dallas and other metropolitan Texas newspapers lately to the effect that a plan was on foot to consolidate the telephone companies in Dallas. Statements made by local officials of both the Southwestern and the automatic companies in Dallas seemed to indicate that some negotiations had been under way.

President J. C. Casler, of the Dallas Automatic Telephone Co., refused to comment on the statement made by Mr. Pettingill.

Convention of Kansas Independent Telephone Association.

The annual convention of the Kansas Independent Telephone Association, to be held at the National Hotel, Topeka, Kan., on February 15, 16 and 17, promises to be the largest meeting ever held by the association. The seventh and a good portion of the sixth floor of the National Hotel have already been reserved by manufacturers for exhibits. Arrangements are being completed for an interesting program, and also for the entertainment of those attending the convention.

Christmas Greetings of California Company to its Patrons.

Shortly before Christmas the Antelope Valley Telephone Co., of Lancaster, Cal., sent out to its patrons an attractive postal card containing Christmas greetings and to which was attached a small 1916 calendar. To carry out the Christmas idea a snow scene encircled by green holly leaves and red berries is shown on the card. As our readers no doubt know, snow is rarely seen in Southern California.

Toll Connections Ordered at Chesaning, Mich.

The Michigan Railroad Commission, on January 20, handed down a ruling in which it ordered the Chesaning (Mich.) Home Telephone Co. to make connections with the Union Telephone Co., of Owosso, for long distance service. About 1,600 subscribers of the Union Telephone Co. in Owosso and vicinity and about 600 subscribers of the Chesaning company will benefit by the order.

Inquiry on Telephone Slugs in Los Angeles.

The city council of Los Angeles, Cal., recently adopted a resolution intended to settle the controversy over the use of slugs in the telephone pay stations in Los Angeles. It requests the board of public utilities to investigate at least 50 nickel-in-the-slot telephones in different sections of the city, strike a reasonable average of the amount of revenue from each telephone and report the results to the council.

Rainier (Ore.) System Sold to Pacific Bell.

Purchase of the Rainier (Ore.) Telephone Co., by the Pacific Telephone & Telegraph Co., was recently announced. The Rainier system comprised about 200 subscribers and was owned by A. L. Clark, county judge of Columbia county.

Annual Reports and Meeting of Telephone Companies

Statements Issued by Independent Telephone Companies in Various Parts of the Country Relative to Their Operations During the Past Year—Earnings and Surplus Accounts Show Companies to Be in Excellent Financial Condition—Election of Officers

Annual Report of Elmore (Ohio) Company.

The annual statement of the New Ottawa County Telephone Co., of Elmore, Ohio, shows a gross revenue of $62,289 for the year ending December 31, 1915; operating expense, $44,089, and a surplus of $1,680 for the year. The statement follows:

GROSS REVENUE.

Exchange service	$46,729
Tolls	15,401
Miscellaneous	159
Total	$62,289

OPERATING EXPENSE.

Traffic	$ 9,633	
Maintenance	10,705	
General expense	9,785	
Taxes	3,518	$33,641
Loss and damage (sleet storm of February 1, 1915)		2,086
Amount expended for reconstruction		8,362
		$44,089
Net earnings		$18,200
Dividends paid during year		$16,520
Surplus for year		1,680

The company had a total of 3,320 telephones in service at the close of the year 1915, an increase of 124 over the previous year. The assets and liabilities of the company, as of December 31, 1915, are as follows:

RESOURCES.

Plants	$202,400
Extra construction	48,125
Buildings and real estate	9,114
Furniture and fixtures	815
Accounts and bills receivable	8,736
Employes working funds	100
Cash	1,171
	$270,461

LIABILITIES.

Capital stock	$206,500
Bills payable	11,200
Reserve for depreciation	26,398
Unearned rentals	461
Accrued taxes	1,392
Outstanding coupons	17
Dividend No. 27, payable February 1, 1916	8,260
Surplus	16,233
	$270,461

The New Ottawa company operates exchanges in Curtice, Elmore, Genoa, Millbury, Oak Harbor, Pemberville, Prairie Depot, Port Clinton, Put-in-Bay and Woodville, Ohio.

Report of Wyocena (Wis.) Co-operative Company.

The annual report of the Wyocena & Pacific Farmers Co-operative Telephone Co., of Wyocena, Wis., recently rendered to the stockholders, indicates an excellent financial condition and good service furnished at $4 per year per telephone. Total cash receipts for 1915 were $923.94, and total expenses $718.66, leaving a balance of $205.28. One large item in the expense was $131 for a new switchboard, necessitated by a large increase in subscribers. The board of directors remains the same as before: O. F. Allen, president; H. J. Dunham, vice-president; and George Kershaw, secretary and treasurer; John Hamilton and Frank Allegar.

Johnstown (Pa.) Telephone Co.'s Annual Report.

The gross earnings of the Johnstown Telephone Co., of Johnstown, Pa., for the year ending December 31, 1915, were $189,933. This sum includes $165,270 from exchange service revenue; $19,070 toll service revenues and $4,237 miscellaneous operating revenue; and $1,356 non-operating revenue. The expenditures were $72,473, leaving net earnings of $117,460. Deducting $106,854 for dividends, interest and miscellaneous items, leaves surplus earnings of $10,606. The company's report of earnings and expenses follows:

EARNINGS.

Exchange service revenue	$165,270	
Toll service revenues	19,070	
Miscellaneous operating revenues	4,237	
Non-operating revenues	1,356	
		$189,933

EXPENDITURES.

Maintenance expenses	$ 17,947	
Traffic expenses	28,664	
Commercial expenses	7,006	
General and miscellaneous expense	18,856	
		72,473
Net earnings		$117,460
Deductions from gross income:		
Miscellaneous	$ 854	
Interest bonds	10,000	
Dividends	96,000	
		106,854
Surplus earnings		$10,606

On January 1, 1916, the company had a total of 7,932 telephones in service, an increase of 448 over the previous year. The statement of assets and liabilities of the company, as of December 31, 1915, is as follows:

ASSETS.

Plant and equipment, including real estate and buildings		$1,018,226	
Working Assets:			
Cash, general accounts	$ 3,569		
Cash, special deposit	15,000		
Petty cash	300		
Subscribers' rental accounts	4,042		
Subscribers' toll accounts	7,603		
Subscribers' sundry accounts	1,436		
Miscellaneous accounts receivable	276		
Material and supplies	63	32,289	
Deferred Debit Items:			
Prepayments		870	$1,051,385

LIABILITIES.

Common stock	$800,000		
Funded debt	200,000	$1,000,000	
Working Liabilities:			
Accounts payable, miscellaneous	$ 59		
Other current liabilities	6,000	6,059	
Accrued Liabilities Not Due:			
Taxes accrued	$ 8,161		
Interest accrued, bonds	4,167	12,328	
Unappropriated surplus		32,998	
			$1,051,385

All of the old directors were re-elected and they renamed the same officers. The roster of officers includes the following: President, Charles Griffith; treasurer, P. F. McAneny; secretary and general manager, E. D. Schade. The directorate includes the officers and Dr. J. B. Lowman, James P. Thomas, George W. Swank, P. S. Fisher, Isaac Marx and W. F. Murdock.

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That RELAYS when properly designed and manufactured give little or no trouble and are doing their work in all parts of the world and all conditions of climate.

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"It may be truthfully said that the standard type of direct current relay is without doubt an essential and indispensable element in modern common battery switchboard equipment. It is important to note the wide limits over which the satisfactory operation of any one of the standard types of relay extends. In other words, it is remarkable how far the operating currents may vary from their normal or average strength and still afford the most satisfactory results in the operation of the relay."

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That our RELAYS will operate with large variations of voltage and a wide range of dial speed.

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Ticker Case Argued in Massachusetts Supreme Court

Arguments of Counsel for Petitioner and Defendants Relative to Jurisdiction of Massachusetts Commission in Ordering the Western Union Telegraph Co. and the United Telegram Co. to Furnish Service to Calvin Foster, of Boston

The full bench of the Massachusetts Supreme Court listened to arguments in the Foster stock ticker case on January 25, relative to the jurisdiction of the Massachusetts Public Service Commission in ordering the Western Union Telegraph Co. and the United Telegram Co. to furnish service to Calvin Foster, of Boston, a broker who appealed to the board some months ago for the re-establishment of quotations. P. H. Kelley, counsel for the petitioner, elaborated the following points in his argument:

Arguments of Counsel for Petitioner.

1. The public service commission has jurisdiction under chapter 784, acts of 1913, over all telegraph companies engaged in the business of furnishing the quotations of the New York Stock Exchange in Boston and vicinity. Assuming that the quotations are private property, there can be no question that in furnishing and distributing them to subscribers in Boston that the telegraph company is engaged in the transmission of intelligence by electricity through the streets of municipalities in the state, and is therefore subject to the jurisdiction of the board.

2. In construing the contract of July 1, 1914, between the Western Union company and the stock exchange, the commission interpreted the provisions of said contract as transferring the property right in the quotation to the telegraph company. This interpretation is correct and is the only possible valid and legal construction.

3. The interpretation placed on the contract by the stock exchange and the telegraph company, to-wit., that the telegraph company's position under the contract is that of a common carrier of messages while that of the exchange is that of a private sender of messages would make the contract illegal and void; in such case the payment of $50,000 per year by the telegraph company to the exchange would constitute an illegal refund and rebate prohibited by section 20 of chapter 784, acts of 1913.

4. The telegraph company, as a public service corporation, is bound to furnish equal service to all. This duty exists at common law independent of statute. The performance of this duty, however, is now specifically provided for by the section above named. The company cannot be permitted to furnish ticker service to others in the city of Boston and to refuse to furnish it to Foster under similar conditions. The company cannot be said to be withdrawing from business by refusing to furnish one person with information which is rendered to others of the public who ask for it. This is discrimination in business, not a retirement from business.

5. If the contract between the exchange and the telegraph company by its terms arbitrarily and unreasonably limits the duty of the telegraph company to furnish equal service to all who desire it in the supply and distribution of New York quotations, then the contract is void as against public policy.

6. The provison in the application to the telegraph company by subscribers for stock exchange quotations providing for a discontinuance of the service solely at the arbitrary will of the telegraph company is void.

7. The quotations of the New York Stock Exchange under the facts established in the report of the public service commission have been so used in the past as to thereby become clothed with a public interest and to thereby make them of public consequence.

8. Assuming that the quotations of the exchange have become a matter of public interest, there can be no question that the provision of chapter 784 of the acts of 1913 regulating the transmission of intelligence, so far as it merely prohibits an unjust discrimination and provides for equal and impartial service, is constitutional, as being within the police power of the state, even though the quotations are the private property of the exchange or of the telegraph company, or of both jointly.

9. The authorities cited by the telegraph company and the exchange have no direct application as contradicting the contentions of the respondent, Foster.

10. The Interstate Commerce Commission has no jurisdiction over the subject matter of Foster's complaint, to-wit., the refusal to furnish quotations. In furnishing such service to subscribers, the telegraph company does not act in its ordinary and usual capacity as a common carrier of messages. Neither the Western Union nor the United companies are within the jurisdiction of the Interstate Commerce Commission except when the companies are performing or refusing to perform duties that apply to them solely in their capacity as common carriers of messages in interstate traffic. In purchasing the property right in the quotations and in later retailing them, the telegraph company does not stand in the relation of a common carrier of messages sent by the exchange, the relation being merely that of a vendor and vendee of commercial news.

11. The order of the public service commission is not illegal or invalid as an improper or illegal interference with interstate commerce.

12. No question of interstate commerce is involved, as the furnishing of the quotations by the telegraph companies to their Boston subscribers is purely intrastate and not interstate commerce. The Foster petition asked for nothing more than the service which is performed wholly within the city of Boston.

Position of Companies.

Arthur Lord, Esq., Boston, counsel for the Western Union and United companies, presented a brief alleging that the commission's order is invalid and unlawful; that the Interstate Commerce Commission has sole jurisdiction in the matter in issue; that the companies did not have the legal right to render the services required by the order, in view of their contracts with the exchange; that the commission ruled erroneously; that the companies had unlawfully discriminated against Foster; and that to compel the companies to comply with the order would appropriate the property of the exchange for the benefit of Foster, and destroy their valuable contracts with the exchange contrary to the provisions of the federal constitution.

The brief held that if any discrimination exists, it is the act of the New York Stock Exchange, which is not a party to the proceedings and over which the commission has no jurisidiction. The translation of the quotations and their delivery in Boston does not alter the interstate character of the business. The companies hold that the New York Exchange has absolute property right in the quotations, and its right to control the distribution of quotations compiled by it is analagous to the right of a press association to furnish service to those only with whom it chooses to contract. The telegraph companies take the position that the delivery of quotations to any person not having contracted with the stock exchange for them would be a violation of law, because in such a case the companies would occupy the position of carriers of the quotation. The contract contains no indication of the intent of the Western Union company to purchase the quotations and re-

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LYNTON T. BLOCK, Attorney and Manager

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sell them to anyone, nor of the exchange to sell such quotations to the telegraph company.

POSITION OF ATTORNEY GENERAL.

Attorney General Henry C. Attwill submitted a 24-page brief contending that the statutes and decisions concerning interstate commerce do not deprive the public service commission of jurisdiction for the reasons that

1. Interstate commerce is not involved, because

(a) There is no question of dealing in a commodity or tangible property, and (b) the interstate character of the communication has ceased before the state regulation begins to act; and

2. Even if interstate commerce is held to be involved, the regulation made is permissible, because

(a) There is no direct burden tax, and the regulation is in fact in aid rather than hindrance of commerce, and (b) congress has legislated only with reference to transmission of messages, and (c) state tribunals may act to enforce the common law not to discriminate, even where congress has acted, if it is not inconsistent with such laws or any action of the Interstate Commerce Commission.

The attorney general held that in this case, as there has been no stay of the commission's order, it should be considered binding and to be carried out by the defendant companies. While it may be an interesting question as to whether the contract between the stock exchange and the companies is valid as to the conditions sought to be imposed, that question is not necessarily involved in these proceedings.

If the companies cease to perform this service for others, Mr. Foster's complaint fails. So long as they continue to furnish it to others the position of the state is that they must, on the facts here disclosed, furnish it to him also. The argument that this duty to the public required by statute and common law may be defeated by reason of contracts under which the facilities furnished to the public are acquired by the public service corporation, has frequently been put forward in the interest of the Western Union Telegraph Co., and so far as known, has with one exception been rejected by the appellate courts to which it has been presented.

In the early days of the telephone business the parent Bell company, a Massachusetts corporation, licensed the use of its telephones by local companies in various communities, and provided that telephones should not be installed in telegraph offices except with its permission and on such terms as it prescribed. It then permitted telephones in the offices of the Western Union but not in the offices of other and competing telegraph companies. Proceedings in various forms were brought by or in the interest of the competing companies to obtain the same service as that accorded the Western Union.

Practically the same situation was presented as in the Foster case. The Bell company, having the absolute ownership of the patents, was attempting to license their use, reserving to itself the right of saying as to a certain class of customers, who should and who should not be served, just as in the present case the stock exchange is licensing the use of its information and attempting to dictate as to all customers what members of the public shall or shall not be served. This argument of the Bell company was rejected and the duty of serving all the public alike without discrimination was declared to be paramount and controlling. Delaware & A. T. & T. Co. vs. State of Delaware, 50 Federal, 677; State, ex rel. Postal Telegraph Co., vs. Delaware & A. T. & T. Co., 47 Federal, 633; Missouri, ex rel. B. & O. Telegraph Co., vs. Bell Telephone Co., 23 Federal, 539. These three cases are cited with evident approval by the United States Supreme Court in Bement vs. National Harrow Co., 186 United States, 70, at 91.

As set forth in the opinion of the public service commission, the Interstate Commerce Commission act has reference only to the transmission of messages, and does not cover the broad ground dealt with by the Massachusetts' act. Even if the transactions in the present case are regarded as the sending of an interstate message, within the meaning of the federal act, this interstate message is from the telegraph company's operator in New York to the telegraph company's representative in Boston, and so far as its interstate character is concerned, the transaction is then completed. The retailing out of the information in Boston is a new and distinct transaction. While there is doubtless a property right in the quotations collected by the New York Stock Exchange, that right can hardly be regarded as a commodity.

Celebrates Passage of 3,000-Mark in New Subscribers.

About 50 telephone managers from all parts of Ohio, Zanesville city and county officials, officers of the Ohio State Telephone Co., from the Columbus headquarters and those participating in the Zanesville efficiency campaign, were present at a dinner last week at the Clarendon Hotel, Zanesville, celebrating the passage of the 3,000-mark in new applications received by the local company since June 13. The record established in Zanesville, the speakers declared, has never been beaten in any city in the country, a grand total of 3,111 new applications having been secured up to Thursday noon, January 27, the time at which the banquet was held.

J. B. Rhodes, Zanesville manager of the Ohio State company, sounded the keynote of the meeting when he announced that the company's campaign would be pushed until an automatic telephone had been installed in "every home and every business place in the city." He said that clean tactics had been pursued throughout the fight for new business.

S. G. McMeen, president of the company, pledged further financial support to the Zanesville field and asked for a fourth 1,000 new applications in the next 90 days.

Frank L. Beam, of Mt. Vernon, president of the Ohio Independent Telephone Association, praised the work of the Independents in that district and described the development of telephony since 1894. "When we started into business there were 30,000 telephone stations in Ohio," he said, "while today there are between 400,000 and 500,000 Independent telephones in the state alone."

Those present at the celebration included the following officers of the Ohio State company: S. G. McMeen, president; G. R. Johnston, vice-president and general manager; H. B. Taylor, treasurer; J. C. Boush, manager of the long distance division; R. R. Stevens, general commercial superintendent; C. C. Morris and C. L. Norton, special agents, all of Columbus.

Others present included: Mayor W. H. Webster, Service Director W. W. Roach, R. B. Brown, secretary of the Zanesville Chamber of Commerce; Judge H. C. Smith, Postmaster J. R. Aleander, all of Zanesville; E. H. Arnold, Mt. Vernon; Col. H. C. Critchfield, Mt. Vernon; C. H. Spencer, Newark; C. E. Hollander, Frank L. Seers, Cambridge; W. H. Bowron, Caldwell; H. W. McKee, Cumberland; W. S. Lentz, Frazeysburg; John D. Erwin, McConnelsville; C. J. Polock, New Concord; H. O. Wright, New Lexington; J. W. Murphy, Junction City; S. C. Herdman, New Concord; C. C. Collins, Logan, and service salesmen, C. S. Baldwin, J. C. Cobb, F. L. McKinney, R. H. Moorehead, C. P. Leslie, M. C. Kimberly, M. C. Brown, A. J. Haughran, A. J. Voll and Michael Kelly.

Telephone Improvements at Winchester, Ky.

The Cumberland Telephone & Telegraph Co. has begun work at Winchester, Ky., on improvements which will cost $10,000. New cables for local business and a reconstruction of the Winchester-Lexington toll lines are parts of the betterment program.

WE started to "Look Ahead" eighteen

years ago and we still have a big future in mind for you as well as for ourselves; so please remember when buying, every one of Cook's products has a big future built right in it before our name goes on — it will mean more to both of us.

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- Mica Fuses (Cook's type)
- Marlin Cable Hangers
- Messenger Hangers
- Messenger Splices
- Protected Pole Cable Terminals
- Switchboard Protectors
- Subscribers' Station Protectors
- Test Connectors
- Toll Line Arresters
- Unprotected Pole Cable Terminals
- "U" Bolt Clips
- Wall Type Distributing Frames
- Wire Sleeves, steel and copper
- Etc., Etc., Etc.

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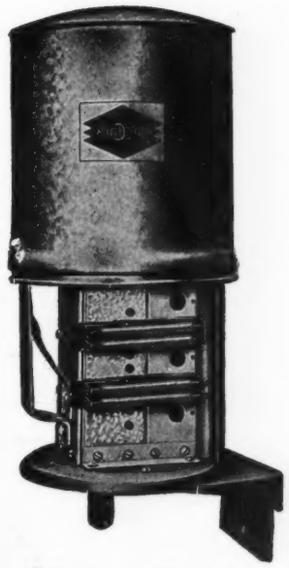

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Cover Up

From Factory and Salesroom

Conventions: Wisconsin, Madison, February 9-11; Kansas, Topeka, February 15-17; Iowa, Des Moines, March 14-16; Texas, Fort Worth, March 16-18

"And the Cat Came Back."

Old timers in the telephone field will remember when the "Pole Cat Brand" of white cedar poles was the standard by which all northern white cedar poles were compared.

The Lindsley Brothers Co., which made the "Pole Cat Brand," so well known in the early days of the Independent telephone business, started in business at Menominee, Mich., in 1896. The first shipment of poles was made to Cincinnati, Ohio. In 1900 the company established a branch office at Portland, Ore., and entered the western red cedar pole business on the Pacific coast. The rapid development of the electric light and street railway interests during the years following led to the discontinuing of the Menominee office in 1906, and the gradual retirement from the white cedar and incidentally the telephone field.

A White Cedar Yard of Lindsley Brothers Co.

Owing to the fact that the large majority of the poles used in telephone construction work are of short lengths, very few of the western cedar poles are used for that purpose. The western cedar grows very large, and the high freight rates from the West precluded their shipment in any considerable quantity into the territory served by the northern white cedar. However, that does not mean no western cedar has been used for telephone construction. The entire system of the Utah Independent Telephone Co., later absorbed by the Bell interests, was built of Lindsley Brothers Co. poles, and, in fact, the larger portion of the old Independent systems west of the Rockies are built of the same stock.

An 80-ft. Cedar Pole from the Minneapolis Yards.

Since 1910 no attempt was made to handle white cedar, but with the establishment of the general sales office and a large concentrating yard at Minneapolis in 1915, the company has again entered the white cedar field, and is ready to serve its old friends and patrons in the Independent telephone field.

Pole yards are now operated by the company in Idaho, Washington, British Columbia, and Minnesota, with a total stock in excess of 100,000 pieces. This enables the company to live up to its slogan, "Good Poles Quick," as its facilities for shipment are excellent.

The company's main yards in the West are at Colville, Wash.; Priest River, Idaho, and Nakusp, British Columbia. Some idea of the size of these yards may be secured from the accompanying illustration of the Nakusp yard. At this yard poles are brought in by water from points along the Arrow Lakes, and are distributed by tram (shown in the center of the picture) to the different skidways. The loading tracks are shown at either side of the yard. This arrangement enables the company to handle 1,000 poles per day in and as many out.

A View of the Nakusp, British Columbia, Yards.

The new Minneapolis yard, while carrying a complete stock of all the standard sizes of both northern and western poles, is meant for rush shipments. Most buyers can anticipate their requirements far enough ahead to allow shipment from the northern and western yards, but for those who need poles in a hurry this yard is proving valuable. One advantage it has is that it is not located in the midst of a great switching yard, but is located in Minneapolis so that shipments are made direct without passing through any transfer yards.

Two treating plants are now operated by the company, and a third is to be constructed immediately. So many companies are now giving the butts of their poles a pre-

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Five Reasons Why You Should Use Them

1st— They are the handsomest telephones made, and subscribers are pleased with them and take pride in keeping them neat. They put a stop to chronic kickers.

2nd— They are built to last almost indefinitely. The black enamel finish will outlast any known wood polish and will match any color of woodwork or inside finish.

3rd— They cost no more than reliable telephones of other makes, and are worth considerably more to you. They do not deteriorate and they save you the heavy maintenance expense you have been accustomed to with others.

4th— They are made by a manufacturer with a reputation for making the best telephone apparatus known. Their guarantee makes you safe.

5th— You will be using Steel Telephones altogether some day, so why not begin now. The sooner you get acquainted with the Ericsson kind the better pleased you will be later.

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servative treatment that the erection of these plants was found necessary. Three different methods of treatment are used: The open tank or dipping treatment with avenarius carbolineum, with high grade creosote, and the "hot and cold" treatment with creosote.

One interesting order the Lindsley Brothers Co. had was

Loading Poles for Shipment to Alberta, Canada.

that for 7,000 poles for the 102,000-volt transmission line of the Montana Power Co., which furnishes the power for the electrification of the Chicago, Milwaukee & St. Paul Railway. This line is unique, in that it is probably the highest voltage carried on wooden poles in the world. All of these were treated with avenarius carbolineum by the open tank process.

In addition to the pole business the Barnes-Lindsley Mfg. Co., of Portland, Ore., another of the Lindsley interests, manufactures high grade Douglas fir cross arms. This mill is operated largely by machinery developed by the company itself, which enables it to make practically the entire operation automatic. This does away with a number of men, and not only reduces the cost of manufacture, but also improves the quality of the arms. As a consequence the company is enabled to furnish its arms at very favorable prices.

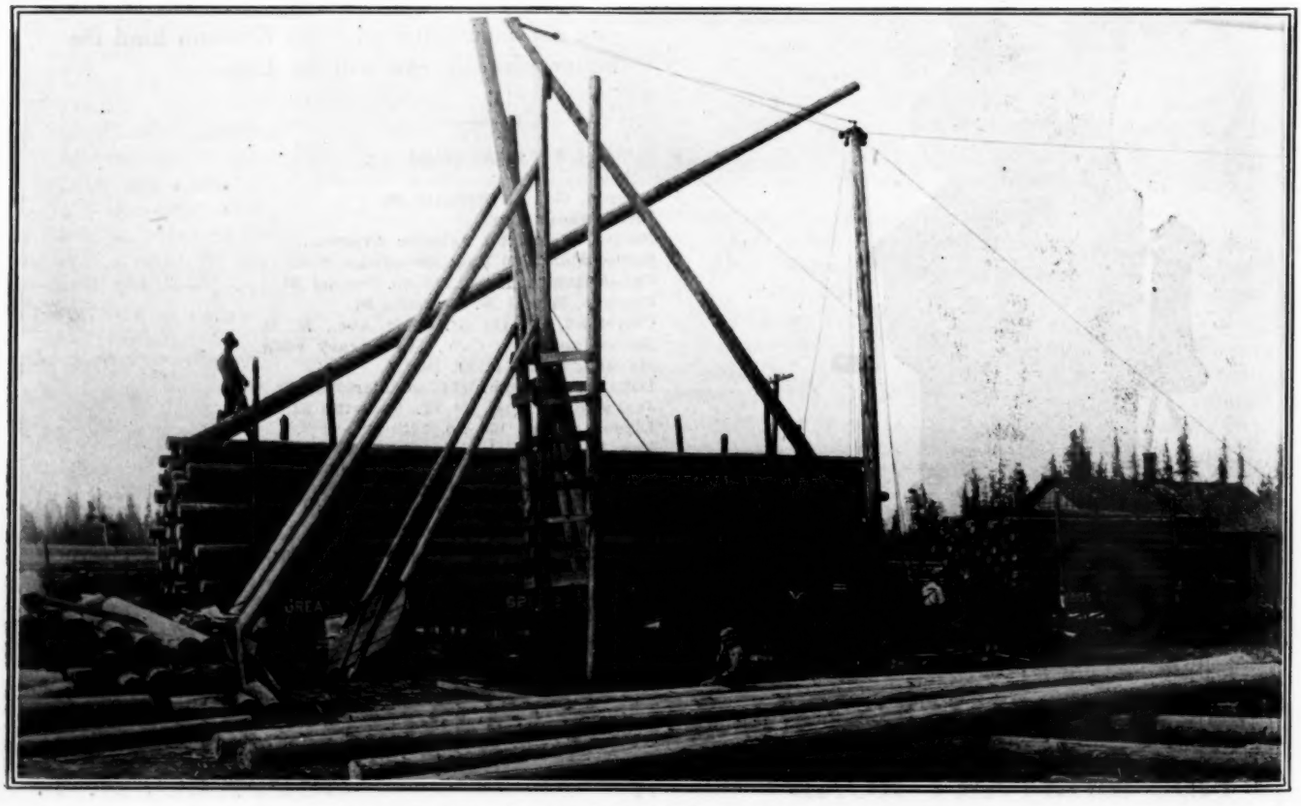
Taken as a whole, the facilities of this company for furnishing poles and cross arms are probably unexcelled. Living up to its "Good Poles Quick" slogan is a habit with it. Telephone men, it is stated, will find the company as ready as ever to give good, square treatment, guaranteed poles and competitive prices.

The general office of the company is located at Spokane, Wash. The general sales office is in the McKnight Building, Minneapolis, Minn., and the southwestern sales office at 405 La Salle Building St. Louis, Mo. It is also represented by the Wendell & MacDuffie Co., 61 Broadway, New York City; Verne W. Shear & Co., Akron, Ohio; Lewis & Roth Co., Denckla Building, Philadelphia, Pa.; Electrical Engineering & Manufacturing Co., First National Bank Building, Pittsburgh, Pa.; John K. Bovard, 705 Merchants Bank Building, Indianapolis, Ind.; Frank E. Filer, Winnipeg, Manitoba, Canada, and Construction Supply Co., Toronto, Ontario, Canada.

Annual Meeting of Monarch Sales Force.

The sales force of the Monarch Telephone Mfg. Co. gathered in Fort Dodge, Iowa, January 27, to 29, for the purpose of holding the annual sales meeting. The results attained during 1915 were carefully analyzed and those in attendance did not hesitate to express themselves as being absolutely certain of even better results during the current year. Everyone was pleased to learn that the business of the Monarch company during 1915 showed a substantial increase over the business of 1914.

The traveling men left for their respective territories after the meeting with the determination to make the year



One of the Two Pole-Treating Plants of Lindsley Brothers Co.

How the Middleman Serves the Consumer

By John Lee Mahin
President of the Mahin Advertising Company

THE retailer does 95 per cent of the business of supplying the wants of the American family. I doubt whether this percentage ever will be much altered. The mail order business will increase and so will the jobber's and retailer's, just as rapidly as elimination of the present waste in our distributive system is changed into increased comfort and luxury for the consumer.

Many people will always find it easier and more satisfactory to order goods by mail after they have read a catalogue; others want to see and examine merchandise before they buy. The question, "What kind of service does the consumer like best?" has as many answers as there are different kinds of people.

The mail order business proves that people scattered over a wide area may be organized and held together by group consciousness.

Once in the backwoods of Kentucky I met a man who isolated himself. He refused to buy anything from the local stores. His greatest satisfaction seemed to be his ability to read and supply his wants by means of the catalogue of a Chicago mail order firm. He evidently felt a personal superiority and distinction—sometimes encountered among "our very best people"—in being able to do something which his less fortunate neighbors could not do, i.e., read.

* * *

There are too many middlemen in a number of lines. There are lines in which one or two bold spirits could, by making use of modern merchandising and advertising methods, increase the scope of their business, get an enormous volume, reduce the cost to the consumer, and give themselves financial returns many times in excess of any sum they can ever make by trying to maintain a fictitious value for the service they render.

Any distributive system which does not bear the test of constantly giving the consumer the best service must fail. And the middleman who opposes the handling of advertised goods because he thinks the consumer, knowing the producer, may go direct to him and thus dispense with the middleman's services, is making a wrong deduction. The consumer is best served when each factor of production and distribution is concentrated upon the one activity for which it is particularly well equipped.

The big jobbing houses in a number of lines must either become large producing units, with the function of distribution as of secondary importance, or they will have to improve their systems of distribution.

THEY will have to use publicity in trade papers and distribute catalogues and letters which anticipate and follow the calls of their salesmen, and they will have to ship direct from the factory, instead of having so large a portion of the merchandise they sell handled so many times.

* * *

In the grocery trade there is much discussion of the comparative value of manufacturers' and jobbers' brands. There are forces at work in the distribution of groceries that seem as relentless and as irreconcilable as those now engaged in warfare in Europe.

A specialty manufacturer sends his salesman to call on the retail grocery trade. He takes orders to be shipped through the jobber. And then he finds out that the jobbers' salesmen have killed a number of them.

Many jobbers control the retailer's trade by granting him credit. Then they can insist that he handle their brands, not the manufacturer's.

Where the consumer is indifferent the conflict is most active. I am convinced that this wasteful antagonism is unnecessary. It can be largely eliminated by a more perfect understanding of what business really is, and a willingness on the part of everybody concerned to give the other man the consideration and courtesy to which his service entitles him.

The best interests of the consumer are the best interests of the retailer. But the consumer does not always understand what is best for him. This is the dealer's opportunity for service. If the retailer personally or his salesmen, who should be governed by service ideals which he has laid down for them, can persuade his customers to accept something which is better for their wants than the particular things for which they ask he is giving them true service by doing so.

The retailer who does this will not be misled by an overzealous salesman who talks large profits on unknown articles against a fair margin on well-advertised articles which move rapidly and give the dealer more profit because of volume. This type of dealer will soon win the confidence of his customers so completely that they will not expect him to meet cut prices on standard articles. They will prefer to trade at a store where scientific methods of distribution are appreciated and used.

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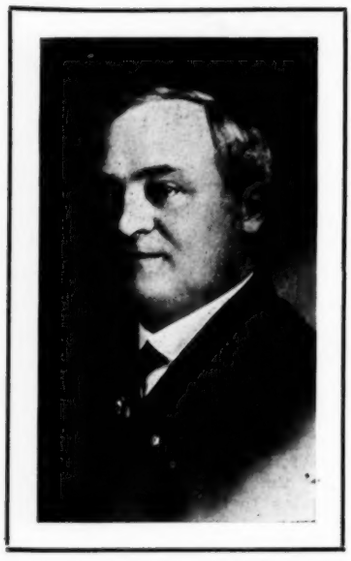
Published by courtesy of Chicago Herald

1916 a banner year in every respect. Those in attendance and the territories they cover, are as follows: G. O. Wilson, Eastern Iowa and Illinois; R. O. Palmer, Minnesota and Wisconsin; B. H. Merriman, Western Iowa and Nebraska; Wm. F. Qualls, Missouri and Kansas, and C. W. Snyder, North and South Dakota.

George H. Crandall Joins the Garford Sales Force.

George H. Crandall, for some time Illinois representative of the Anderson Electric Car Co., of Detroit, Mich., recently severed his connections with that company and joined the sales force of the Garford Mfg. Co., of Elyria, Ohio, on February 1.



George H. Crandall.

He has been connected with the Independent telephone business for nearly 20 years, the last ten of which were spent with the Kellogg Switchboard & Supply Co. During his association with the Kellogg company he traveled in Michigan, Canada, Texas, New Mexico and Illinois, the last seven years having been spent in Illinois. Last June he "departed from the ways of righteous," as he expresses it, and accepted a position with the Anderson Electric Car Co., only to return to the telephone business in less than a year.

Mr. Crandall is well and favorably known by a great number of Independent operating companies, each of which will be glad to learn that he is again in the telephone field. He states that he will call on his many friends and see them personally just as fast as he can get around.

Book Reviews.

THE TELEPHONE AND TELEPHONE EXCHANGES; THEIR INVENTION AND DEVELOPMENT, by J. E. Kingsbury. Published by Longmans, Green Co., London and New York. 558 pages, 8¾ ins. by 5¾ ins. 169 illustrations. Price, $4.

This book, as its name indicates, deals with the historical aspects of the telephone and exchange equipment rather than with its practical operation. It is a most interesting volume relating the events leading up to the invention of the instrument and the evolution of the present great industry.

The development of the telephone is taken up in an interesting manner which leads up to the introduction and use of switchboards. The introduction of the telephone into commercial use in the United States and later in Europe and abroad is related and the difficulties encountered are not overlooked or slighted. The technical development of the multiple switchboard, automatic exchanges and progress both inside and outside the exchange is set forth in detail.

The most important inventions in the telephone art are discussed and their development traced. The subjects considered, in addition to apparatus and equipment, include telephone engineering, long distance service, rates, telephones and the governments. The volume discusses not only American telephone history but also English history as well.

Much could be written relative this book and the matter treated in it, and then there would be yet more to say. The author has produced a most readable record of telephone history embracing invention, development, organization, commercial application, rates and service and has included in it many facts not previously assembled in available form. As providing a concise record of development of the telephone, the book is entitled to high rank.

EXAMPLES IN MAGNETISM, by F. E. Austin, Hanover, N. H. Published by the author, 90 pages, 7¼ by 4¾ inches, 32 illustrations and tables. Price $1.10.

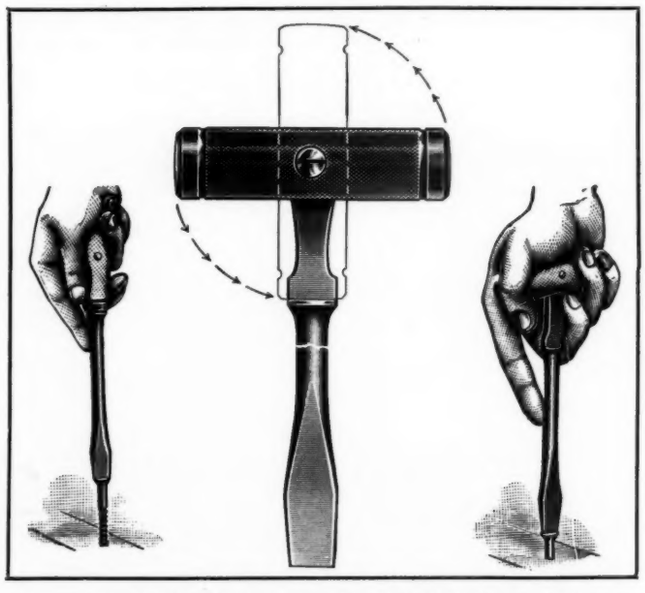
This little book is intended for students of physics and electrical engineering in either colleges or home study courses. The first part is devoted to setting forth trigonometric relations and functions, units and definitions used in physics, all of which lead up to the subject of magnetism. The problems and examples give simple applications of the laws or principles of physics and mechanics in both qualitative and quantitative aspects.

A carefully stated example is first given with the algebraical or symbolical expression denoting the physical law which applies. The solution is then explained, step by step. A problem of a similar nature to the example is then presented and its answer stated. This is then followed by another dealing with some phase of the same subject. By this method the student is enabled to make satisfactory tests as to his knowledge.

Crescent Hamr-Handl Screw Driver.

The Hamr-Handl screw driver shown in the accompanying illustrations has just been placed on the market by the Crescent Tool Co., of Jamestown, N. Y. This tool can be used as an ordinary screw driver or greatly increased leverage may be obtained by means of the folding T handle, a spring holding the handle in place in either position. One end of the handle is solid and can be used as a light hammer for starting a screw. The tool may then be used as an ordinary screw driver and when the screw is nearly set and difficult to turn, the hammer handle may be sprung into position and the screw firmly placed. Attractive display easels will be furnished to supply dealers desiring to handle this tool. The easel is made of heavy cardboard, 13 by 10 ins., and weighs 2¼ lbs. with the tools.

The screw driver is made in three different sizes, with a four-inch, a five-inch and a six-inch blade, respectively. The company will be pleased to send literature and further particulars upon request.



Hamr-Handl Screw Driver Showing Use of Folding T Handle.

Paragraphs.

THE COFFEY SYSTEM & AUDIT CO., of Indianapolis, Ind., is installing its accounting system for the United Telephone Co., of Muskegon, Mich.

"The Automatic Weathers Every Storm"

Stormy weather and "cold" bring troubles, thick and fast, to Manual Telephone Companies.

Switchboard operators, too delicate to brave the blizzard, stay home. Girls too ill to work, fail to report for duty.

Schedules are demoralized.

The Service suffers.

The Subscribers complain.

Automatic Equipment

Keeps on operating no matter what the weather may be.

The "Girl-less" is always "on the job."

It is always ready for duty.

For service, for efficiency, for economy, you need the

Automatic Telephone

Automatic Electric Company

CHICAGO

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

Personal.

LOUIS G. GOMEZ, consulting telephone expert for the Colorado Public Utilities Commission, has been engaged as the American representative of the Australian government committee on public utilities. He will make an exhaustive report on the telephone situation in all parts of America, and, at the conclusion of his work with the Colorado commission, will go to Australia to study the telephone business there for the government.

PERRY C. HOLDOEGEL, of Rockwell City, Iowa, is a candidate for nomination for state senator from the Webster-Calhoun district, with no opposition. Nomination in this district is practically equivalent to election. Mr. Holdoegel was for years chairman of the county central committee of Calhoun county at Rockwell City. The primaries will be held in June.

Perry C. Holdoegel.

He is secretary and general manager of the Central Mutual Telephone Co., with headquarters in Rockwell City. He entered the telephone business in 1893, after some 14 years in public school work and serving three years as principal of the Calhoun County Normal School. In that year he organized the Woodbine Telephone Co., at Woodbine, Iowa, his home town, and in 1895 was active in the formation of the Central Mutual company. He has managed the latter company ever since. Mr. Holdoegel has been very active in Independent telephone affairs, both state and national. He has served several terms as president of the Iowa Independent Telephone Association and is now a member of its excutive committee in addition to being a director of the United States Independent Telephone Association. Mr. Holdoegel is one of the most popular Independent telephone men in the state of Iowa and is held in high esteem by his many friends.

G. E. DOYING, of Jacksonville, Ill., has been appointed assistant secretary of the Illinois Public Utilities Commission.

THOMAS E. GREEN, of Columbus, has been appointed telephone expert of the Ohio Public Utilities Commission, succeeding George X. Cannon, resigned.

G. W. DENHAM, manager for the Cumberland Telephone & Telegraph Co., at Bardstown, Ky., will be succeeded by R. H. Conner, manager at Petersburg, Ind., Mr. Denham assuming management of the Petersburg exchange.

GENERAL A. P. WOZENCRAFT, of Dallas, Texas, retired as general attorney of the Southwestern Telegraph & Telephone Co. on February 1, to become consulting attorney for the company. General Wozencraft has been identified with the Southwestern company in Texas for years, and is an authority on corporation law. He will leave Dallas early in February for a vacation of several months, and is to visit Cuba and South America.

HERBERT J. JEFFERY, district manager of the Paducah Home Telephone & Telegraph Co., at Paducah, Ky., has tendered his resignation and will leave April 1 for Toledo, Ohio, where he will enter the real estate business. In 1906 Mr. Jeffery assumed charge of the Paducah Home plant, as local manager. He resigned that position in 1909 and for three years was connected with the Paducah Pole & Timber Co. In 1911 he returned with the Paducah Home company as district manager. During his administration the company's business has been doubled, presenting a most efficient and creditable record. B. Y. Chambers, now general superintendent of the Central Home Telephone & Telegraph Co., of Louisville, Ky., will succeed him.

New Companies and Corporations.

PATOKA, ILL.—The Patoka Telephone Exchange Co., has been incorporated with a capital stock of $1,500 to operate a telephone exchange and telephone lines. John Thalman, Philip Mojonnier, Wm. Williams, R. L. Lambert, T. P. Walker and Jos. Yardley are the incorporators.

SPENCER, IOWA.—Farmers of O'Brien county have organized a mutual telephone company to be known as the Great Western Telephone Co. It will have an authorized capital of $150,000.

ALPHA, MICH.—The Alpha Telephone Co. has been incorporated with a capital stock of $10,000. The incorporators are P. Garrigan, E. C. Bradley, and R. G. Whitehead.

MANTEO, N. C.—The Dare County Telephone Co., of Manteo, has been incorporated with a capital stock of $10,000, with a subscribed stock of $1,120. The incorporators are: R. Bruce Etheridge, Manteo; Charles W. Mann, Manns Harbor; W. O. Barnett, Manns Harbor.

DUNN CENTER, N. D.—The L. M. & D. C. Telephone Co., a corporation just organized with Dunn Center as its headquarters, will build the rural line from Dunn Center to Manning, building to begin within the next few weeks. The name in full is Longfellow, Manning & Dunn Center Telephone Co.

AFTON, OKLA.—The United Telephone Co. was incorporated recently with a capital stock of $50,000. The incorporators are: H. W. Hukenthal, T. D. Trickey. F. S. Miller, E. C. Patton, R. S. Hamsher and H. C. Miller.

CARMEN, OKLA.—The Line O Telephone Co. was incorporated recently with a capital stock of $1,000. The incorporators are: C. Ring, J. J. Frank and G. C. Lunch.

NOPAL, TEXAS.—The Nopal Telephone Co., of Nopal, De Witt county, has been incorporated with a capital stock of $360. The incorporators are: E. W. Sunday, C. A. Hattenbach and M. C. Billings.

OCHILTREE, TEXAS.—The Ochiltree Telephone Co. was recently incorporated with a capital stock of $10,500 to take over the holdings of the old company of the same name and improve the present plant. The officers of the company are as follows: President, J. N. Stump; vice-president, C. E. Forbes; secretary and manager, W. L. Fain.

PARKERSBURG, W. VA.—A certificate of incorporation was issued to the Home Telephone Co. with an authorized capital of $25,000. The incorporators are: T. E. Graham, C. M. Martin, W. E. Stomt, J. E. Park.

Franchise.

FORT WORTH, TEXAS.—The county commissioners have granted a franchise to T. B. George for the construction of a telephone line from the city limits to the Ten Mile Bridge along the Azle road. It is specified that in case the road is changed at any time the poles shall be moved to conform.

Elections.

MACOMB, ILL.—The Macomb Telephone Co. held its annual stockholders' meeting and elected the following board of directors: C. K. Todd, A. Messmore, H. L. Argenbright, W. Binnie, J. H. Hungate, C. M. Staiwalt, and E. S. Slusher. At a subsequent meeting of the directors, officers for the ensuing year were chosen as follows: President, C K. Todd; vice-president, H. L. Argenbright; secretary, Miss Birdie Brown; treasurer, A. A. Messmore and manager, E. S. Slusher.

MEREDOSIA, ILL.—The annual meeting of the stockholders of the Farmers & Merchants' Telephone Co. was held recently. Two new directors were elected, Joseph Smith and H. L. Deppe. The other directors are L. F. Berger, W. D. Meier, Riley Steinberg, Charles Schlicker and J. W. Duvandack.

RIPLEY, IND.—The Ripley Farmers Co-operative Telephone Co. elected directors for the ensuing year as follows: Edward N. Phillips, James Nelson and Milton Pitts, Morristown; Henry B. Phelps and Charles E. White, Carthage; Alva Newhouse and Jacob D. Todd, Occident.

ROCKVILLE, IND.—The Judson Telephone Co. held its annual meeting recently and elected a board of directors for a one year term. O. T. Payton was re-elected president; O. A. Weatherford, secretary, and A. C. Jolly, treasurer.

HAVE YOU LOOKED THEM OVER

Spring, with its repair work, replacements and new line work, is almost here. Have you looked over your tool room to see if you are ready for your gangs—are all the shovels, spoons and diggers in good condition? Do you need a few new ones or some new handles? And how about pike poles?

Pike Poles

OSHKOSH PIKE POLES are made of Washington fir of finest yellow old growth, free of defects. This insures a light strong pole without splinters. Pikes are of hand forged crucible steel with long taper riveted in.

TRADE MARK OSHKOSH

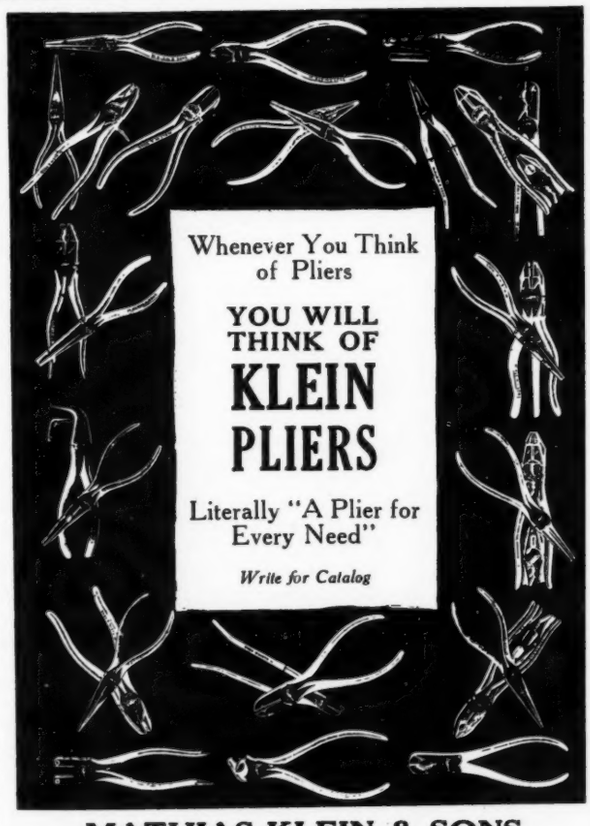
Digging Tools

OSHKOSH SHOVELS and SPOONS are made with maple or hickory handles. We recommend the maple because it is lighter, and, while just as strong, costs less. Blades are .70-.80 crucible steel of regular weight.

Write our nearest warehouse for prices and literature—or better, order direct from your jobber—but specify OSHKOSH.

OSHKOSH MANUFACTURING COMPANY
OSHKOSH, WISCONSIN

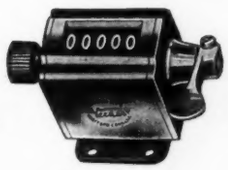
NEW YORK	PHILADELPHIA	PITTSBURGH	SAN FRANCISCO
Northwestern Electric Equipment Company	L. K. Simons Electric Company	Union Electric Company	H. B. Squires Company



MATHIAS KLEIN & SONS
CANAL STATION 34 Manufacturers CHICAGO
Eastern Office, Domestic & Canada: Surpless, Dunn & Co., 74 Murray St., New York

Veeder Small Set Back
Counters
for
Telephone Switchboards

One Turn of the Knob Resets to Zero



Indispensable for Making Traffic Records

One-half Size

As it is desirable that telephone exchanges learn periodically the comparative amount of work performed daily by the operators as well as the total number of calls answered daily, this counter is almost indispensable to an up-to-date exchange.

Write for Catalog which Gives a Complete Description

The Veeder Mfg. Co.
11 Sargeant St., Hartford, Conn.

Cyclometers for Bicycles and Motorcycles, Odometers for Automobiles and Horse Drawn Vehicles, Counters for Practically Every Possible Purpose, Tachometers, Tachodometers, and Fine Die Castings.

GRINNELL, IOWA.—At the annual meeting of the stockholders of the Interior Telephone Co. the following board of directors was elected: C. W. H. Beyer, J. P. Lyman, L. G. C. Peirce, Charles R. Clark, H. G. Lyman, G. L. Saunders and Harold L. Beyer. The directors elected the following officers for the ensuing year: President, Harold L. Beyer; vice-president, Charles R. Clark; secretary, H. G. Lyman; and treasurer, C. W. H. Beyer. G. L. Saunders continues as general manager. At a directors' meeting, held January 12, the usual semi-annual dividend of 3 per cent. on preferred stock and 2 per cent. on common stock was declared, payable to the stockholders of record on January 1, 1916.

SHENANDOAH, IOWA.—At the recent annual meeting of stockholders of the Independent Mutual Telephone Co. the same directors were re-elected for another year. They are as follows: Levi Baker, M. H. Driftmier, Frederick Fischer, Elbert A. Read and J. F. McQueen. The officers are: Levi Baker, president; M. H. Driftmier, vice-president and general manager; Frederick Fischer, secretary, and Elbert A. Read, treasurer. The company had a very prosperous year, having a steady growth in the number of subscribers, and an increase in net earnings.

PORTSMOUTH, IOWA.—The Farmers' Mutual Telephone Co., held a meeting recently and the following officers were elected: President, Henry C. Bickels; vice-president, John Heubner; treasurer, John Heikenrath; secretary, F. W. Hainley; directors, Otto Johnson Joe Heubner, and Sam Ditzler.

ABILENE, KAN.—The annual meeting of the Acme Telephone Co. was held recently. These officers and directors were elected for the ensuing year: Geo. Lenhert, president; John Seaton, vice-president; J. G. Engle, secretary-manager; R. L. Seaton, treasurer. The other three members of the board of directors are Wm. Nelson, Robert Stone and B. Dunlap.

HUDSON, KAN.—The German Valley Telephone Co. held its annual meeting recently. Officers for 1916 were elected as follows: President, Anton Hullman; vice-president, Fred Fischer; secretary, H. J. Ringering and treasurer, Wm. Ochle.

MONMOUTH, KAN.—The annual business meeting of the Monmouth Telephone Co. was held recently. The following officers were elected: President, Grant Winger; secretary, B. F. Fitzgerald; treasurer, G. R. Hardin.

SMITH CENTER, KAN.—The Hummer Mutual Telephone Co. held its annual meeting recently and elected four directors: A. M. Carpenter, Crystal Plains; A. P. Carter; C. Brogan and L. C. Uhl, Jr., of Smith Center city.

MODENA, MINN.—The annual meeting of the Blue Grass Telephone Co. was held recently and the following officers elected for the ensuing year: James Gleason, president; C. Kirschman, vice-president; J. A. Marshal, secretary; G. L. Bennett, treasurer; and John Tabery and S. L. Flothe, directors.

OZARK, MO.—At the annual meeting of the members of the Rural Telephone Co. officers for the ensuing year were elected. Grant Gooch, president of the company, was re-elected to the position. The remainder of the officers are U. S. Bylion, vice-president, and Stephen K. Stime, secretary-treasurer. The board of directors is composed of U. S. Bylion, A. D. Forgey, W. A. McGinnis, Hamilton Scott, Grant Gooch, chairman, and Stephen K. Stime, secretary.

SPRING GARDEN, MO.—The annual telephone meeting of the Spring Garden Telephone Co. was held recently. H. C. Miller was elected president; John S. Lumpkin, vice-president; Claude L. Henley, secretary, and T. W. Bond, treasurer; with the two latter on special committee for switchboard repairs.

BENTON RIDGE, O.—Officers for the Benton Ridge Mutual Telephone Co. have been elected as follows: President, J. C. Miller; vice-president, W. H. Wittenmeyer; treasurer, Daniel Jackson; secretary, B. C. Wittenmeyer.

OXFORD, OHIO.—The Oxford Telephone Co. elected these directors: E. E. Williams, Llewellyn Bonham, S. H. Allen, Dr. C. O. Munns and J. W. Hutchisson. The board organized by electing Williams president and Bonham vice-president. W. C. McSherry was chosen secretary and treasurer.

WOODVILLE, O.—The Lemoyne-Woodville Telephone Co. held its annual meeting recently and elected the following officers: President, J. L. Herman, Lemoyne; secretary, E. G. Baker, Woodville; treasurer, A. H. King, Lemoyne; general manager, A. C. Root, Lemoyne.

ENID, OKLA.—The Oklahoma Rural Telephone Co., of Oklahoma, held its annual meeting recently. The following directors were elected to have charge of the business for the next year: David Stephens of Patterson township; M. C. Ash of Garland; J. D. Bilderback of Carrier; B. T. Stebbins of North Enid Township; Roy Walters. At a meeting of the board of directors after the annual meeting the officers re-elected were: President, David Stephens; vice-president, M. C. Ash. The secretary-treasurer and general manager of this line at Enid is F. D. Owens, who has an office at room 212 in the Beck building.

RENFROW, OKLA.—The Renfrow Rural Telephone Co. held its regular annual meeting recently and elected officers for the ensuing year. A. B. Hunter was elected president for another term; C. S. Clark was re-elected vice-president; A. C. Andrews was named as secretary-treasurer and E. A. Krause was re-elected manager.

PRINCETOWN, PA.—The Princetown Rural Telephone Co. elected officers for the ensuing year, as follows: President, S. Hill; secretary, D. H. Manwiller; treasurer, Daniel Buskirk. The other directors are G. W. Brown and W. H. Noll.

YELLOW HOUSE, PA.—The annual meeting of the Manatawny Rural Telephone Co. was held recently. The following officers were re-elected: President, George H. Schearer, Amityville; vice-president, John R. Guldin, Yellow House; secretary, W. D. Reeser, Yellow House, and treasurer, M. E. Weidner, Earlville. These directors were also re-elected: Llewellyn Leinbach, Yellow House; George B. Griesemer, Pleasantville; H. D. Renninger, Pikeville; M. H. Kline, Earlville, and John M. Schearer, Yellow House.

KURTEN, TEX.—The Kurten Telephone Co. has elected officers for the ensuing year, as follows: Rev. J. J. Kasiske, president; William Manthel, first vice-president; M. B. Easters, second vice-president; Henry Prinzel, corresponding secretary; Charley Nedtke, financial secretary, and August Prinzel, treasurer.

LA CROSSE, WASH.—At the annual meeting of the directors of the La Crosse Telephone Co. the following officers were elected: W. P. Rathburn, president; William Ladd, vice-president; Dr. C. J. Simonson, secretary.

Construction.

NEW HAVEN, CONN.—Work has been started on a brick storehouse on Liberty street for the Southern New England Telephone Co. It will be one story high, of brick, 70 by 120 feet, with a slag roof. The building will cost $20,000.

LOUISVILLE, KY.—The Louisville Home Telephone & Telegraph Co. has secured a permit to build a branch exchange at Bardstown road and Rosewood to serve the Highlands. It will cost $17,500, and will be a two-story structure. It is to be completed July 1.

KANSAS, CITY, MO.—The Missouri & Kansas Telephone Co. will expend several thousand dollars this spring putting in cables and other betterments at the Halstead, Kan., exchange, it is announced. It is planned to put in several cables to replace the single wire lines and have every patron on a metallic line.

CINCINNATI, OHIO.—The Cincinnati & Suburban Bell Telephone Co. will build a new branch exchange at the southwest corner of Woodburn avenue and Locust street, Walnut Hills.

SANDUSKY, OHIO.—The Central Union Telephone Co. will within the next six months, spend about $20,000 in Sandusky on overhead and underground cable work, so Manager McCabe announces.

WILKES BARRE, PA.—A plot of land for the erection of a new telephone exchange, located at the corner of Division street and Wyoming avenue, Kingston, was purchased recently by the Bell Telephone Co. Plans for the building have been started by the engineering department of the company and it is expected that the actual work of construction will be started within a few months. The lot is 60 by 200 feet and extends on Division street from the avenue to an alley. Wire and cables, leading to west have been placed underground and the conduits were extended some time ago to the alleyway in the rear of the proposed location. The new building will be of brick construction, and Colonial design, two stories in height.

Miscellaneous.

BARBOURSVILLE, KY.—Independent telephone companies of Barboursville, Pineville, Middlesboro and Harlan, with a number of rural extensions, have been merged into the Tri-State Telephone Co. with a capital stock of $100,000. Charles Chalder, of London, is president of the new company, and C. S. Brock, secretary and treasurer. No changes are contemplated in the operation of the various changes, but a considerable sum will be expended in further strengthening the consolidated system with additional extensions contemplated.

OAKLEY, KAN.—H. B. Fallgatter a short time ago closed a deal for the sale of the Oakley Telephone Co. to J. W. Matousek, of Esbon, Kan. An item appearing in a recent issue of The Oakley (Kan.) Graphic commends Mr. Fallgatter and his wife very highly for the service rendered under their management. Mr. Fallgatter and his wife left the first of the month for Kansas City, Mo.